PROCEEDINGS

of TAIEX – JRC Workshop on Scientific Technical Reference System on Renewable Energy & Use Efficiency:

"Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries"

Tallinn, Estonia, 6-8 July 2005

Edited by

Paolo Bertoldi

Bogdan Atanasiu

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
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The report does not represent any official position of the European Commission, nor do its contents prejudge any future Commission proposals in any areas of Community policy.

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AIM OF THE WORKSHOP

The overall aim of the workshop was to contribute to the implementation of the new energy savings measures and to provide more accurate information and data to National and European policy makers, in particular on the electricity use in buildings and on the energy services activities. These data will be used to promote the diffusion of efficient technologies and innovative energy saving schemes.

The scope of the workshop was to foster the energy services activities and the efficient use of electricity in tertiary and residential sectors from New Member States and Candidate Countries. Another important target of the event was to help the decision makers to improve the Energy Efficiency Framework, at National levels, in order to contribute to reach the overall environmental and energy targets.

The previous two editions of the workshop were focused mostly on data collection about the electricity end-use efficiency in buildings from tertiary and residential sectors in New Member States and Candidate Countries. As result new data were obtained and gathered for a detailed report. Now the level of knowledge in this area has improved and new decisions could be adopted in order to foster the energy saving activities. This present edition of our workshop comprised also discussions concerning the results of this report.
This third edition addressed mainly energy services and financing of energy efficiency projects in buildings from New Member States and Candidate Countries, presented also highlights of electricity end-use status and conclusions about electricity saving potential.

All the international institutions working on innovative financial solutions were invited to the workshop to present their activities and highlight possible synergies.

MOTIVATION

The efficient use of energy and electricity in particular, is one of the most important and cost effective ways in order to achieve the main EU sustainability and environment & energy policy objectives:
- preserve the environment by reducing the greenhouse emissions from the energy sector (Kyoto Protocol target, in-force from February 2005),
- limit the import dependence of EU energy sector by reducing the waste of energy on the demand side,
- ensure the sustainability of the EU energy liberalised sector and foster the penetration of energy efficient equipments and techniques in EU market.

EU Enlargement process became reality last year and soon other two countries will become Member States.
It is very important to know the status, trends and barriers for energy efficiency on the demand side in the New Member States and Candidate Countries and to find appropriate solutions to implement as soon as possible energy efficiency policies and to overcome the existing barriers.

The use of energy in buildings is one of the main targets for an effective energy saving policy. Together with transport, the building sector is one of the two priority sectors identified by the European Commission (EC) to reduce growth in energy demand. Buildings account for around 40% of final energy consumption in Europe and offer one of the largest single potentials for increased efficiency. It is estimated today that, due to the many market barriers and market imperfections that still exist, there is a very large economic potential that remains in the form of unrealised energy savings. For the domestic and tertiary sector this potential is estimated to be approximately 22% of current final consumption, realisable by 2010 [MURE model, EU 2003].

The increased use of energy services as well as the increased investments in energy efficiency will provide added value to the energy supply industry, allowing for greater product differentiation and increased competitiveness for energy on the basis of non-price factors (such as product quality, comfort and customers satisfaction). Promoting the competition on the energy services market now will also allow a larger number of customer-oriented local retail companies to survive the ongoing trend toward market concentration.

Improved energy efficiency will also allow more rapid intervention if necessary to shift or reduce peak loads on the infrastructure of grid-bound energy, such as electricity. Recent blackouts in the EU have once again highlighted the necessity of managing energy demand.

SUMMARY OF THE WORKSHOP

The third edition of the workshop on electricity end-use efficiency and energy services was organised in Tallinn between 6 and 8 of July 2005.

The Agenda of the workshop was structured in three main parts (energy end-use data, energy services and financing energy efficiency); in total 31 presentations were scheduled in 5 sessions:

- Session 1: Appliances and lighting
- Session 2: Electricity end-use in residential and tertiary sectors
- Session 3: Energy Services Companies: Status and Related Projects
- Session 4: Energy Services Companies: Country reports
- Session 5: Financing of Energy Efficiency Projects.

Seven additional presentations were given during the open discussions, all of them describing status and activities of energy efficiency and energy services companies from Candidate Countries.

The workshop started on 6 July with a welcome speech from Ms. Ratso, Deputy General Secretary from Estonian Ministry of Economic Affairs and Communications, and it was a good opportunity for all the participants to learn more about energy policy framework in Estonia and the main policy initiatives to further promote energy efficiency activities.

Mr. Bertoldi from JRC, the chairman of the workshop, followed with an introductory presentation about latest developments of the EU energy efficiency policies. The main points of his speech were a short overview of the energy saving potential in the EU as proposed in the new Green Paper and a short inventory of the main EU Directives and Directive proposals related to energy efficiency. In particular he presented the proposal for a Directive on energy end-use efficiency and energy services, still under discussion and with amendments from EP and political agreement by the Council. This will be a major contribution to the development of a market for energy efficiency.

Ms. Urge-Vorsats from the Central European University from Hungary chaired the first session of the workshop. Mr Meli from CECED presented the results of the unilateral commitment of European white goods manufacturers on washing machines, refrigerators and freezers; he stressed that the presented advancements constitute true energy savings as since 1994 adjusted net volumes of refrigerators have increased in total by 1.7 % only. He was followed by Ms. Soregaroli from GfK, Italy, with a presentation about the status of the main appliances sales on New MS and CC markets, analysed by market potential, energy classes and by main characteristics of each appliance (refrigerators, freezers and washing machines).

The participants highlighted the problem of import and sale of obsolete and less efficient second hand appliances; it appears that while in some countries (e.g. Turkey and Bulgaria) second hand appliances still represent an important part on some of the appliance markets, there is no information on the exact situation and no framework to prevent obsolete appliance transfer. The problem of price differences between A class and B class appliances was discussed; such price gaps are not neglectable and constitute a barrier for efficient equipments penetration on markets still characterised by a low purchase power factor.

After the general overview about the appliances market, the representative of appliances manufacturer Gorenje, Mr. Lah, showed a specific example about the new technology achievements for efficient household wet appliances (washing machines and dryers).

Mr. Podsiadlo from The European Lamp Companies Association showed the most recent efficient lamps technology and the advantages offered by the new and efficient lamps in order to achieve an important amount of electricity saving and the Kyoto Protocol targets for CO2 reduction.

At the end of the first session Ms. Fraczek from Polish Consumers Federation presented the role of consumer's protection organisations and how they can act in order to properly represent consumers' interest including a lower energy bill through efficient appliances.

The second session of the first day was on electricity end-use efficiency in tertiary and residential sectors chaired by Mr. Elek from the Energy Center Hungary.

The first presentation by Mr. Klinckenberg was an overview of the Central and Eastern European Countries Appliance Policy project (CEECAP) with the aim of facilitating and stimulating the effective implementation of appliance energy efficiency policy in Central and Eastern European Countries.

Four country reports presented the status of energy/electricity end-use efficiency in Slovenia (Ms. Urbancic from Institute Josef Stefan), Czech Republic (Mr. Bubenik from Czech Energy Agency), Slovak Republic (Mr. Honaizer from Slovak Energy Agency) and Estonia (Mr. Laaniste from Min. of Economic Affairs and Communications). It was emphasized that in previous years there were significant mistakes in the methodology for collecting data about the electricity consumption in tertiary sector (Slovak Republic), data which seems to be still very difficult to be collect in almost all the New MS and CC.

The second day of the workshop started with the report on Electricity End-use Consumption in New MS and CC in Tertiary and Residential Sectors presented by Mr. Atanasiu from JRC which comprised the latest results of the JRC surveys. The discussions which followed, moderated by Mr. Bertoldi from JRC as chairman, highlighted the necessity of a common data collection methodology and the necessity to prepare complementary new common projects under EIE programme in order to foster and refine the data collection process.

During the open discussions two representatives from Bulgaria, Mr. Kolev from the State Energy Agency and the Ms. Chobanova from EnEffect, and Mr. Tantareanu from Enero, Romania described the status and potential for energy efficiency in these Candidate Countries.

The third session of the workshop was focused on energy services companies (ESCO's) and started with the presentation of Ms. Moscosco-Osterkorn, the Director of Renewable Energy and Energy Efficiency Partnership (REEEP) International and also chairman of this session, about REEEP activities. Ms. Rezessy from Central European University, Hungary presented a detailed report about the status of ESCOs in New MS and CC, a part of a recent JRC survey. The JRC initiatives which can represent also opportunities for ESCOs were presented by Mr. Bertoldi; this included the European GreenLight, GreenBuildings and Motor Challenge Programmes as well as the ESCO web pages from the JRC web site.

Mr. Iqbal from Maicon Associates Ltd, UK presented the International Energy Efficiency Financing Protocol and the opportunities that may be offered for financing energy efficiency activities.

The role of audits and public procurement to foster the ESCO industry were presented by Mr. Zeman from Seven, Czech Rep. This closed the general overview about ESCOs and prepared the ground for the country reports on energy services session.

Session 4 on "Energy Services Companies: Country reports" was opened with a presentation of Mr. Krauth from Base, Germany and chairman of this session about the UNEP Sustainable Energy Finance Initiative.

The session was a good opportunity to acquire up-to-date information about the status of ESCO in 6 New MS presented by Mr. Murajda from C-Therm, Slovak Rep., Mr. Szajner from Sigma Termodynamik Ltd, Poland, Mr. Rodics, Greenergy Ltd, Hungary, Mr. Tepp, Energy Saving Bureau, Estonia, Mr. Rochas, Ekodoma, Latvia and Mr. Zeman, Seven, Czech Rep. During the open discussions another three ESCO's representatives, Mr. Zahariev from KES, Bulgaria, Mr. Pop from EnergoEco and Mr. Dragostin from Energy-Serv, Romania, presented few of their projects and the main barriers for energy services companies in these Candidate Countries.

Some conclusions of this session were:

- ESCOs in New MS and CC are present on almost all markets in NMS and CC, but well developed only in some of these countries (Hungary, Czech Rep.).

- the companies which provide energy services in New MS and CC are not *stricto sensu* ESCOs. Some companies do not assume the risks of energy savings, do not guarantee the energy savings or use M&V and appear to be more interested in the sale of energy and/or equipment than in energy savings.

- the majority of the ESCO's projects are developed in industry and in public buildings (hospitals, schools, military buildings etc.). In Hungary, for instance, industrial and renewable projects are increasingly attractive for ESCOs, while after an initial hype (and probably exhaustion of most attractive projects) district heating and municipal projects are becoming less common. Most of the country speakers agreed that the residential sector could be very attractive from energy saving point of view. However it is difficult to put together more buildings owners in a single project and in most of the cases the owners or owners associations cannot cover the bank guarantee. In some cases banks have conservative lending practices for energy efficiency projects, do not accept cash-flow based projects and in fact require big guarantees (e.g. 120 % in Romania).

- financing of the projects is usually organised or assisted by the ESCOs, and not so often by the client.

- not all the countries have a good ESCO industry (e.g. in Poland state subsidies have left little space for commercial activities).

The third day of the workshop was dedicated for financing energy projects and the chairman of the first part of this session was Mr. Sambucini from UN Economic Commission for Europe. The first two speakers, Mr. Ligot from EBRD and Mr. Johansen from World Bank, presented the mechanisms and activities of these institutions for financing energy efficiency projects, successful stories and perspectives. Mr. Dasek from International Financing Corporation presented CEEF Program tasks, tools, structure and its role in Central Europe, highlighting also the main three barriers for energy efficiency in CEE: legal (ownership legislation), sociological (low awareness, weak management) and social (limited potential for tenants to repay debt). CEEF is partially active in the residential sector (especially for the block houses): it offers risk sharing by providing partial

guarantees for loans from domestic financial institutions and technical assistance to end-users, FIs and ESCOs

Mr. Pool from European Investments & Partners presented an innovative energy efficiency financing mechanism in the housing sector (housing cooperatives) in Poland; this is a multi-step financing method starting with shortest payback measures in the appropriate period of the year in order to achieve in short time energy savings able to compensate the projects debts and create a revolving fund that will finance measures with longer payback periods.

Mr. Constantinescu from Energy Charter Secretariat presented the role of Governments in financing energy efficiency by creation of energy efficiency funds, taxation facilities and others specific measures.

The second part of financing session, with Mr. Constantinescu, Energy Charter as chairman, started with Ms. Racolta, UNDP/GEF presentation about the project developed in Romania for GHG emissions reduction through energy efficiency measures. Mr. Weores, EnergoBanking, Hungary presented loan, equity and securitization financial instruments for energy efficiency and gave comprehensive examples with standard loan based alternatives in Hungary and with district heated and blockhouse modernisation funds in Hungary. Mr. Voronca, FREE, Romania presented the Romanian Energy Efficiency Found projects and activities.

The residential sector represents a huge potential for energy savings with short pay-back time.

An overarching conclusion is that there are multiple financing initiatives from WB, EBRD, GEF, IFC and private banks in many New MS and CC; however there is no coordination among these activities and there is a lack of awareness by the market operators and ESCOs. The carbon market could represent an addition source of revenues for energy efficiency, not yet exploited.

WORKSHOP IN FIGURES

In three days of the workshop, a total of 38 oral presentations were made; 74 official participants representing EU Commission, National and International Associations and Financial Institutions, National Ministries or Agencies, Private companies, Universities and NGO's from 23 countries: Albania, Austria, Bosnia&Herzegovina, Belgium, Bulgaria, Croatia, Czech Republic, Estonia, Finland, Germany, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Serbia&Muntenegro, Romania, Slovak Republic, Slovenia, The Netherlands, Turkey, UK.

SPECIAL THANKS FROM THE ORGANISERS

The organisers want to thank the TAIEX Office from DG Enlargement and to DG JRC which jointly organised this workshop.

Many thanks must to be addressed to the Ministry of Economic Affairs and Communications of Estonia and to the Estonian experts who kindly and promptly help us to organise this event.

We want to thank also to all the speakers and chairmen who have contributed essentially to the highest technical level of the workshop as well as to the participants for their active contribution during open discussions.

Last but not least we want to thank to our kind hosts from Reval Hotel Olympia who offered us a pleasant place to stay and carried on every time to have a very good logistic support for the workshop.

It is not usual to thank a city; however we will say only that Tallinn was the perfect place to organise one of the most important events of the year in the field of energy efficiency, offering us a nice weather, long daylight and above all the opportunity to spend few hours in a town with a beautiful medieval architecture.

THE ORGANISING TEAM

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WORKSHOP AGENDA

6 July 2005

13.30 Registration

14:00 Signe RATSO, Deputy Secretary General, Ministry of Economic Affairs and Communications, Estonia - Welcome speech

14.15 Paolo BERTOLDI, DG JRC, European Commission - Welcome and Introduction. Latest developments of EU energy efficiency policies

Session 1: Appliances and lighting: stakeholders and experts view

Chairman: Diana URGE-VORSATZ, Central European University, Hungary

14.30 Matilde SOREGAROLI , GfK, Italy - "Overview of sales and trends for main appliances in year 2004"

14.50 Luigi MELI, CECED – "The European Manufacturers achievements in year 2004"

15.10 Piotr PODSIADŁO, Lamps C&EE – "Trends for lamps in residential and commercial sectors from EU-15, New MS and CC"

15.30 Olesia FRACZEK, Polish Consumer Federation National Council – FK, Poland – "The importance of energy efficiency for reducing the customers bills"

15.50 Jože LAH, Gorenjie, Slovenia – "Energy consumption of appliances: technological achievements"

Session 2: Electricity end-use in residential and tertiary – status and trends

Chairman: Laszlo ELEK, Energy Centre Hungary, Hungary

16.30 Frank KLINCKENBERG, Klinckenberg Consultants, The Netherlands

– "Appliances policies in Central and Eastern Europe (CEECAP project)"

16.50 Josef BUBENIK, Czech Energy Agency, Czech Republic - "Country report on electricity end-use efficiency: Czech Republic."

17.10 Madis LAANISTE, Min. of Economic Affairs and Communications, Estonia – "Country report on electricity end-use efficiency: Estonia"

17.30 Andreja URBANCIC, Institut Jozef Stefan, Slovenia – "Country report on electricity end-use efficiency: Slovenia"

17:50 Marian HONAIZER, Slovak Energy Agency, Slovak Rep. - "Country report on electricity end-use efficiency: Slovak Republic"

18.10 End of Day I

7 July 2005

Session 2: Electricity end-use in residential and tertiary – status and trends

Chairman: Paolo BERTOLDI, DG JRC, European Commission

09.00 Bogdan ATANASIU, DG JRC, European Commission – "Report on Electricity end-use consumption in NMS and CC in tertiary and residential sectors"

09.30 Open discussion:

Final electricity use in NMS and CC in tertiary and residential sectors

Supplementary presentations:
1. Kolio Kolev, Energy Efficiency Agency, Bulgaria: "Energy Efficiency Potential in Buildings in Bulgaria"
2. Biliana Chobanova, EnEffect, Bulgaria: "Country report on electricity end-use efficiency in buildings: Bulgaria"
3. Cristian Tantareanu, Enero, Romania: "Country report on electricity end-use efficiency in buildings: Romania"

Session 3: Energy Services Companies: Status and Related Projects

Chairman: Marianne MOSCOSO-OSTERKORN, REEP International, Austria

11.00 Silvia REZESSY, Central European University, Hungary – "Overview of the current status of ESCO's development in NMS & CC"

11.20 Paolo BERTOLDI, DG JRC, European Commission – "The European GreenLight, GreenBuildings and Motor Challenge Programmes, an opportunities for ESCO's"

11.40 Anees IQBAL, Maicon Associates Ltd, UK – "The International Energy Efficiency Financing Protocol"

12.00 Jiri ZEMAN, Seven, Czech Republic - "The role of audits & public procurement to foster the ESCO industry"

12:20 Volker KRAUTH, Base, Germany – "Overview of SEFI activities, tools and projects"

Session 4: Energy Services Companies: Country reports

Chairman: Volker KRAUTH, Base, Germany

14.00 Tomas MURAJDA, C-TERM spol. s r.o, Slovak Rep. - "ESCO in Slovak Republic: Projects, Market, Barriers"

14.20 Andrzej SZAJNER, Sigma Termodynamik Ltd, Poland – "ESCO in Poland: Projects, Market, Barriers"

14.40 Gergely RODICS, Greenergy Ltd, Hungary – "ESCO in Hungary: Projects, Market, Barriers"

15.00 Jaan TEPP, Energy Saving Bureau, Estonia – "ESCO in Estonia: Projects, Market, Barriers"

15.50 Claudio ROCHAS, Ekodoma, Latvia – "ESCO in Latvia: Projects, Market, Barriers"

16:10 Jiri ZEMAN, Seven / Dusan Bako, Siemens, Czech Republic - "ESCO in Czech Republic: Projects, Market, Barriers"

16.30	Open discussion: Energy services companies in NMS and CC *Supplementary presentations:* *1. Florin Pop, EnergoEco, Romania: "ESCO in Romania: Projects, Market, Barriers"* *2. Catalin Dragostin, Energy-Serv, Romania: "ESCO in Romania: Projects, Market, Barriers"* *3. Dimitar Zahariev, Kez, Bulgaria: "ESCO in Bulgaria: Projects, Market, Barriers"*
18.00	***End of the Day II***

8 July 2005

Session 5: Financing of Energy Efficiency Projects – Part I

Chairman: Gianluca SAMBUCINI, UN ECE IREED

9.00	Jaquelin LIGOT, EBRD – "The EBRD financing mechanisms for energy efficiency projects. Successful stories"
9.20	Peter JOHANSEN, World Bank - "World Bank approach for financing energy efficiency projects in New Member States and Candidate Countries"
9:40	Adam POOL, PP Investments, Poland – "Innovative financing of ESCO's"
10.00	Martin DASEK, International Financing Corporation- CEEF Czech Republic – "Commercializing energy efficiency finance-CEEF"
10.20	Tudor CONSTANTINESCU, Energy Charter - "Financing Energy Efficiency - role of Governments"
10.40	*Coffee break*

Session 5: Financing of Energy Efficiency Projects – Part II

Chairman: Tudor CONSTANTINESCU, Energy Charter Secretariat

11.00	Stefania RACOLTA, UN GEF – "UNDP/GEF – capacity built for energy efficiency"
11.20	Botond WEORES, EnergoBanking, Hungary – "Financial engineering for funding of energy efficiency at district heated buildings"
11:40	Gianluca.SAMBUCINI, UN Economic Commission for Europe, IREED – "UN ECE EE21 financial initiative for efficiency investment"
12:00	Mihai VORONCA, FREE, Romania: "Crediting Intelligent Consumption: Steps to Success"
12:20	Final discussion: Open discussions on financing energy efficiency projects *Supplementary presentation:* *1. Beata WISZNIEWSKA, REEEP/REC for CEE , Poland: "REEEP - renewable energy & energy efficiency partnership"*
13.00	***Final summary & End of the workshop***

Extra materials (submitted but not presented)

Nenad PAVLOVIC, Serbian Energy Efficiency Agency, Republic of Serbia: "Improvement of Energy Efficiency in Serbia-Aproach, programmes and projects"
Chris HAMANS, Rockwool International: "Cost-Effective Climate Protection in the EU-Building Stock"

INTRODUCTION

EU ENERGY EFFICIENCY POLICIES

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The Latest Energy Efficiency Policy Developments in the EU

Paolo Bertoldi,
European Commission, Directorate General JRC

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Green Paper: The Importance of Energy Efficiency

- **Competitiveness and the Lisbon agenda.**
  - An effective energy efficiency policy can make a major contribution to EU competitiveness and employment, which are central objectives of the Lisbon agenda.
- **Environmental protection and the EU's Kyoto obligations.**
  - Energy saving is without doubt the quickest, most effective and most cost-effective manner for reducing greenhouse gas emissions, as well as improving air quality, in particular in densely populated areas. It will therefore help Member States in meeting their Kyoto commitments.
- **Security of supply.**
  - Today the European Union imports about 50% of its energy. If nothing is done, 70% of the EU energy would be covered by imports by 2030. By 2030, on the basis of present trends, the EU will be 90% dependent on imports for its requirements of oil and 80% dependent regarding gas.

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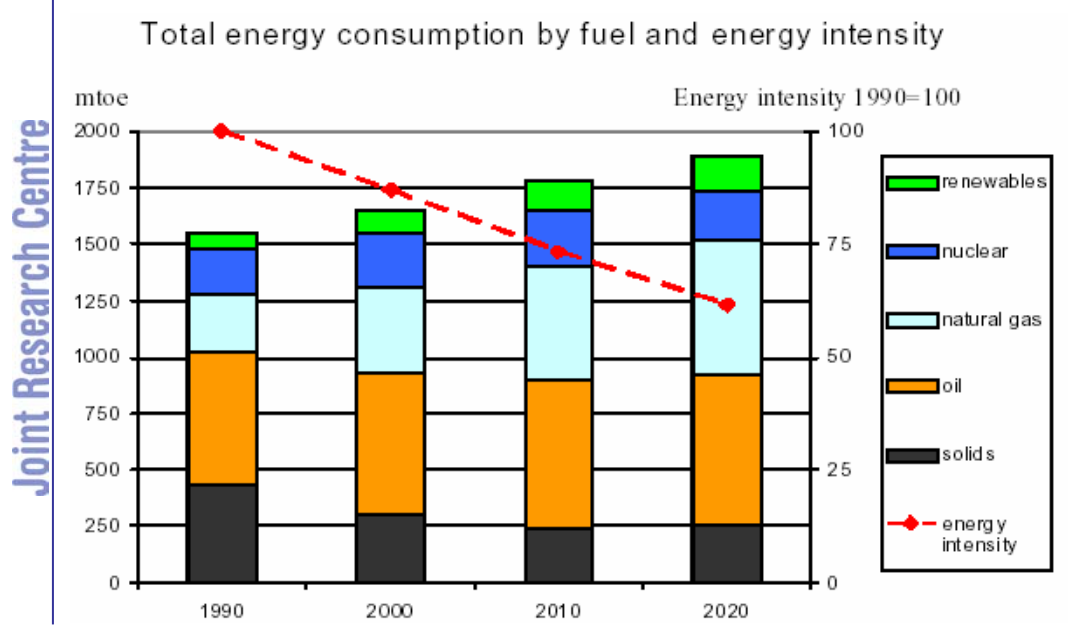
Energy Continues to Grow



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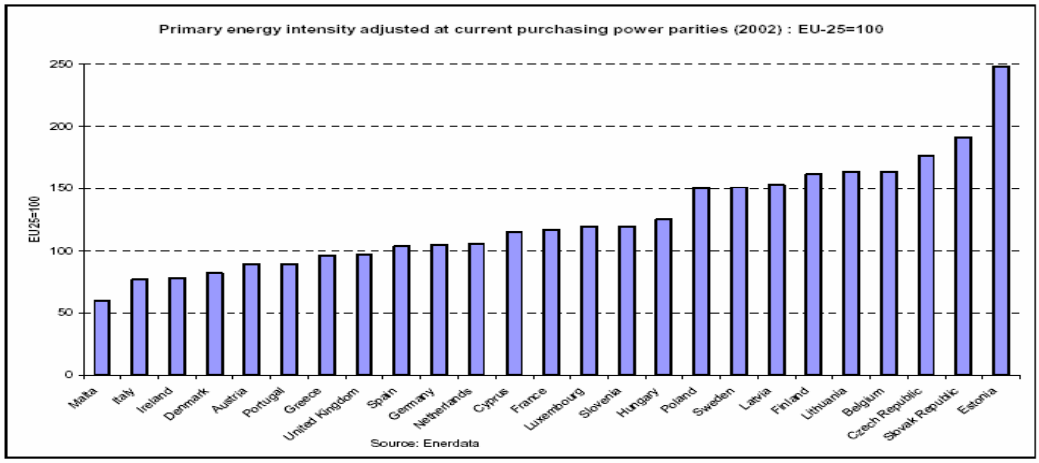
Differences exists among Member States



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Paolo BERTOLDI, European Commission DG JRC

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The Green Paper

- If the current trend continues, gross energy demand could increase by **10%** by **2020**. Growth in electricity demand could also reach **1.5%** per year. Today's consumption in the EU could reach **1900 Mtoe** within 15 years (**2020**), compared with **1725** Mtoe in **2005**.
- Estimates indicate that we could reduce consumption by **20%** by **2020** that is a saving of **60** billion euros a year.
- By saving **20%** of energy consumption by **2020**, it would be possible to secure 50% of the necessary reductions of CO2 emissions.
- Saving **20%** of energy consumption would also strengthen the competitiveness of our economy and facilitate the creation of one million jobs in Europe.

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The Green Paper

- **10%** savings could be carried out by fully implementing the measures already

- **Existing European legislation on energy efficiency**
  - Directive on energy performance of buildings
  - Directive on the promotion of cogeneration
  - Directive on energy efficiency requirements for ballasts for fluorescent lighting
  - Directive on energy efficiency requirements for refrigerators and freezers
  - Directive on energy efficiency requirements for hot water boilers
  - Directives on labelling of electric ovens, of air-conditioners, refrigerators/freezers, washing machines, dishwashers, driers, lamps
  - Regulation on Energy Star labelling for office equipment

- **Proposals to be adopted**
  - Directive on Eco design requirements for energy using products
  - Directive on energy efficiency and energy services

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Saving Potential in Appliances

	Electricity Savings Achieved in the Period 1992-2003 [TWh/year]	Consumption in 2003 [TWh/year]	Consumption in 2010 (with current policies) [TWh/year]	Consumption in 2010 Available potential to 2010 (with additional polices) [TWh/year]
Washing Machines	10-11	26	23	14
Refrigerators and Freezers	12-13	103	96	80
Electric ovens	-	17	17	15.5
Standby	1-2	44	66	46
Lighting	1-5	85	94	79
Dryers	-	13.8	15	12
DESWH[40]	-	67	66	64
Air-conditioners		5.8	8.4	6.9
Dishwashers	0.5	16.2	16.5	15.7
Total	24.5-31.5	377.8	401.9	333.1

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Saving Potential

Potential savings in Mtoe	2020 Rigorous implementation of adopted measures	2020+ Implementation of additional measures
Buildings: Heating/cooling	41	70
Electric appliances	15	35
Industry	16	30
Transport	45	90
CHP	40	60
Other energy transformation, etc	33	75
Total energy savings	190	360

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Overview of European industrial EE policy instruments

- Energy management (EMAS)
- Agreements (Negotiated, Voluntary, Unilateral, Long Term)
- Energy Audits
- IPPC Directive
  - Energy Efficiency BREF under development.
  - Article 3 says: "Member States shall take the necessary measures to provide that the competent authorities ensure that installations are operated in such a way that energy is used efficiently;"
- Best practice (and specific programmes)
- Emission Trading

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New Instruments

- Better use of taxation;
- Opening up public purchasing;
- Measures in the transport sector (tyres, Developing a market for clean vehicles);
- *White certificates, a market-based instrument;*
- *Develop Energy Services and ESCOs;*
- Develop Financial Sources;

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Framework Directive for the setting of Eco-design Requirements for Energy-using Products (EuP)

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Eco-design Requirements for Energy-using Products Article 13.2

- starting with those products which have been identified by the ECCP as offering a high potential for cost-effective reduction of greenhouse gas emissions**, such as heating and water heating equipment, electric motor systems, lighting in both the domestic and tertiary sectors, domestic appliances, office equipment in both the domestic and tertiary sectors, consumer electronics and HVAC (heating ventilating air conditioning) systems;**
- **a separate implementing measure reducing stand-by losses for groups of products.**

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Eco-design Requirements for Energy-using Products Calendar /1

July 2005:

Council & Parliament to formally adopt the Directive.

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Eco-design Requirements for Energy-using Products Calendar /2

Early 2006:

creation of the Consultation Forum

End 2006:

creation of the Regulatory Committee

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Eco-design Requirements for Energy-using Products Calendar /3

June 2007:

Directive to be transposed into national law by the Member States

End of 2007:

First implementing measure (s)

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Eco-design Requirements for Energy-using Products Calendar /4

On-going:

study on developing a methodology to identify whether an EuP responds to the criteria of Article 12 (eligible for an implementing measure) and which eco-design requirements could be set for that EuP

see http://www.eupproject.org/

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Eco-design Requirements for Energy-using Products Calendar /5

7th July 2005:

launching of a tender for 14 preparatory studies on EuPs with a high potential of reduction of GHG emissions

(see indicative list of Article 13 – slide 2)

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Proposal for a Directive on Energy end-use efficiency and energy services

Objectives, scope, content, targets, progress, way forward

(red = amendments by EP and Council)

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Objectives of Directive

- Promotes cost-effective energy efficiency with targets, mechanisms, incentives, institutional, financial & legal frameworks.
- To develop a commercially viable market for energy efficiency & energy services (market transformation).

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Scope

- Covers all energy suppliers (distributors and/or retailers) of: electricity, gas, district heating & cooling, heating oil, coal, lignite, transport fuels, etc. (Small companies may be excluded (100GWh/10 pers/2 M€.)
- End-use sectors include:
  -domestic, agricultural, public and tertiary sectors.
  -non-energy intensive industries
  -transport
  -ET sector excluded (12,000 installations.)

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Contents 1/4

- 1 % annual overall uniform target (Article 4):

  - cumulative to 2012; 6 years (EP wants 9-yr target; mandatory)
  - target fixed; independent of GDP. (MS want indicative.)
  - early actions (1995) allowed; (1991). EP =2000.
  - benchmarking & top-down allow impacts of market, taxes

  -(MS, CION and EP want harmonised top-down/bottom-up and committee) EP: 1yr to negotiate differentiated, then uniform and increasing. Avg 1.3%/yr.)

- "white certificates" later. (Have gained in importance.)

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Contents 2/4

- 1,5 % annual public sector target (Article 5):
  - a sub-target of the overall 1 % target (PS=10%).

  - uses aggregated public procurement to increase demand for energy efficiency & energy services. Leadership by example.

- M.S. do not want definition or public sector target, but only measures.
- EP and CION want public sector target.

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Harmonised lifetimes of energy efficiency improvement measures
(Some energy measures last decades, others for shorter periods.

Bottom-up measurements

- Loft insulation professional - private 30 years
- Cavity wall insulation - private 40 years
- Glazing E to C rated (in m²) 20 years
- Boilers B to A rated 15 years
- Heating controls - upgrade with boiler replacement 15 years
- CFLs - retail 16 years

– Source: Energy Efficiency Commitment 2005 - 2008, UK

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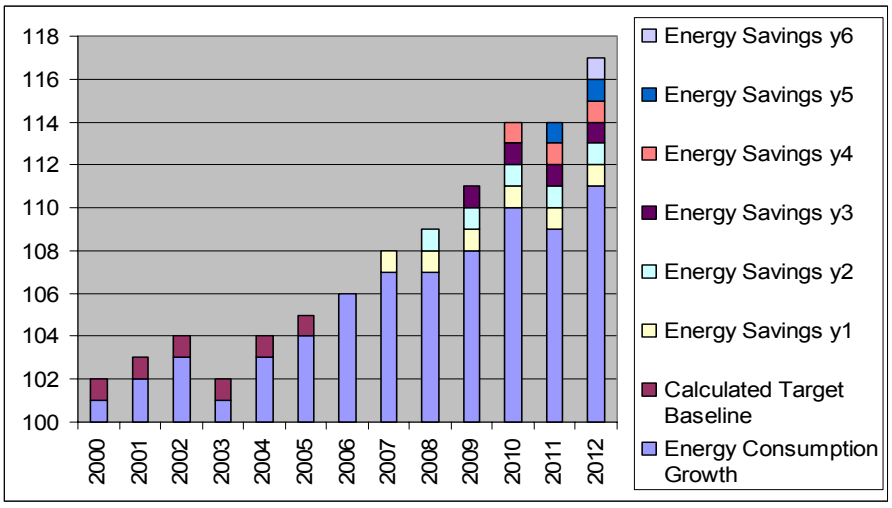

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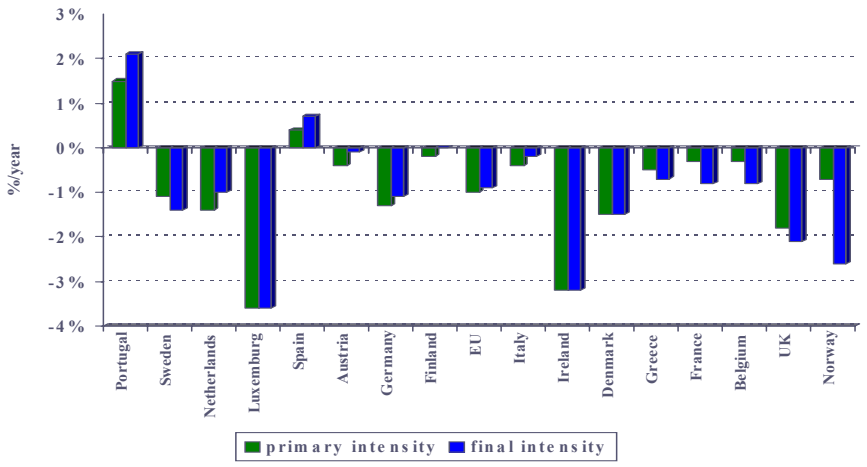
Top-down intensity indicator



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Benchmarking (VDEW model)

- To establish indicators for all end-use sectors and sub-sectors. (A top-down calculation).
- To establish benchmarks to indicate which Member States need to improve and which are above benchmark.
- To track changes in intensities in sectors and sub-sectors for monitoring compliance with targets.
- Advantage: allows all market and non-market impacts to be credited.
- Has been introduced in an amendment by the EP.

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Contents 3/4

Obligation on all distributors and/or retail energy sales companies (Art. 6) to ensure:

-Information to authorities, avoidance of obstacles

-Provision to customers of one or more of: energy services, energy audits or measures, fund contributions, participation in voluntary agreements or market-oriented scheme, e.g, white certificates .

- Qualification of providers of energy services and other energy efficiency improvement measures (Art. 8)
- Financial instruments (third-party contracts, performance contracting, etc.) (Art.9)

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Contents 4/4

- Energy-efficient tariffs (Art. 10) (no cost recovery)
- Energy efficiency funds (State aid rules) (Art.11)
- Energy audits (Art. 12)
- Better metering and billing (Art.13)
- Review and adaptation of annexes to technical progress (Committee) (Articles 15 and 16)

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The situation

- CION, Council and EP favour harmonised measurement regime. E.P. 3+3+3; 1.3%/yr.
- Committee to harmonise measurement system.
- Mixture of bottom-up & top-down. Increasing share of bottom-up. Benchmarking included in top-down.
- CION & EP want mandatory targets; Council indicative.
- CION & EP want public procurement target; Council no.
- White certificates and bottom-up: UK, IT, FR, DK, NL, BE(FL)

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Progress/Procedure thus far

- European Parliament Plenary Vote on 7 June.
- Strong support in EP for mandatory targets, strong Directive in 2nd reading.
- Luxembourg Presidency has worked hard on proposal. 28 June Energy Council: Political Agreement
- UK Presidency: will push hard to reach agreement in 2nd Reading by end of 2005.

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Thank you for your attention!

Paolo.Bertoldi@cec.eu.int

For more information about the Green Paper:
http://europa.eu.int/comm/energy/efficiency/index_en.htm

SESSION 1:

APPLIANCES AND LIGHTING: STAKEHOLDERS AND EXPERTS VIEW


GfK Group
Retail & Technology
28 October 2005
OVERVIEW
OF SALES AND TRENDS FOR MAIN APPLIANCES IN YEAR 2004
Tallinn, 6-8 July 2005
GfK


GfK Group
Retail & Technology
ENERGY EFFICIENCY WORKSHOP Tallinn 6-8 July 2005
28 October 2005
GfK
Data shown in this report refer to
PURCHASES of major domestic appliances
by families in Europe in year 2004
Auditing is done through a SAMPLE of important shops cooperating with GfK.
Sales of the sample shops are then expanded to represent the UNIVERSE of the respective country.

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Countries: Central East Europe + Baltics

- Croatia (HR)
- Slovenia (SI)
- Czechia (CZ)
- Slovakia (SK)
- Poland (PL)
- Hungary (HU)
- Romania (RO)
- Bulgaria (BG)
- Estonia (EE)
- Lithuania (LT)
- Latvia (LV)

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APPLIANCES object of the report

- Washing machines
- Dishwashers
- Refrigerators
- Freezers

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CENTRAL EASTERN EUROPEAN COUNTRIES *

WASHING MACHINES

* Analysis exclude Russia, Ukraine and others

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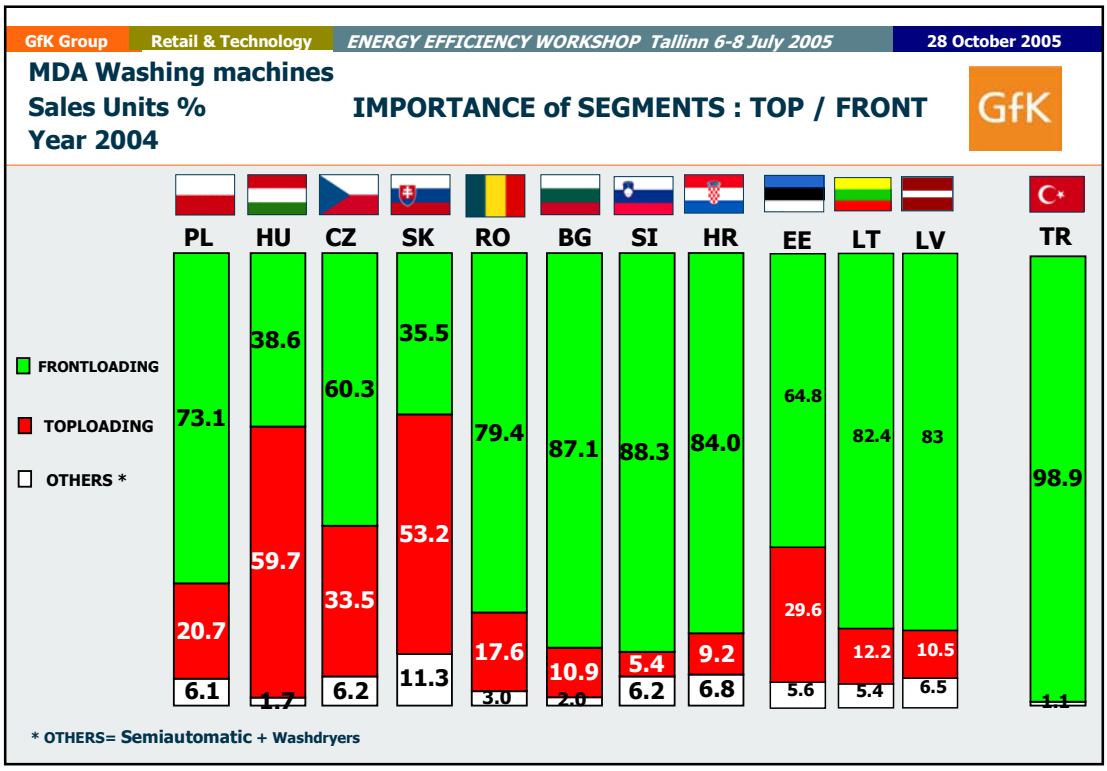
WASHING MACHINES

FRONT LOADING

TOP LOADING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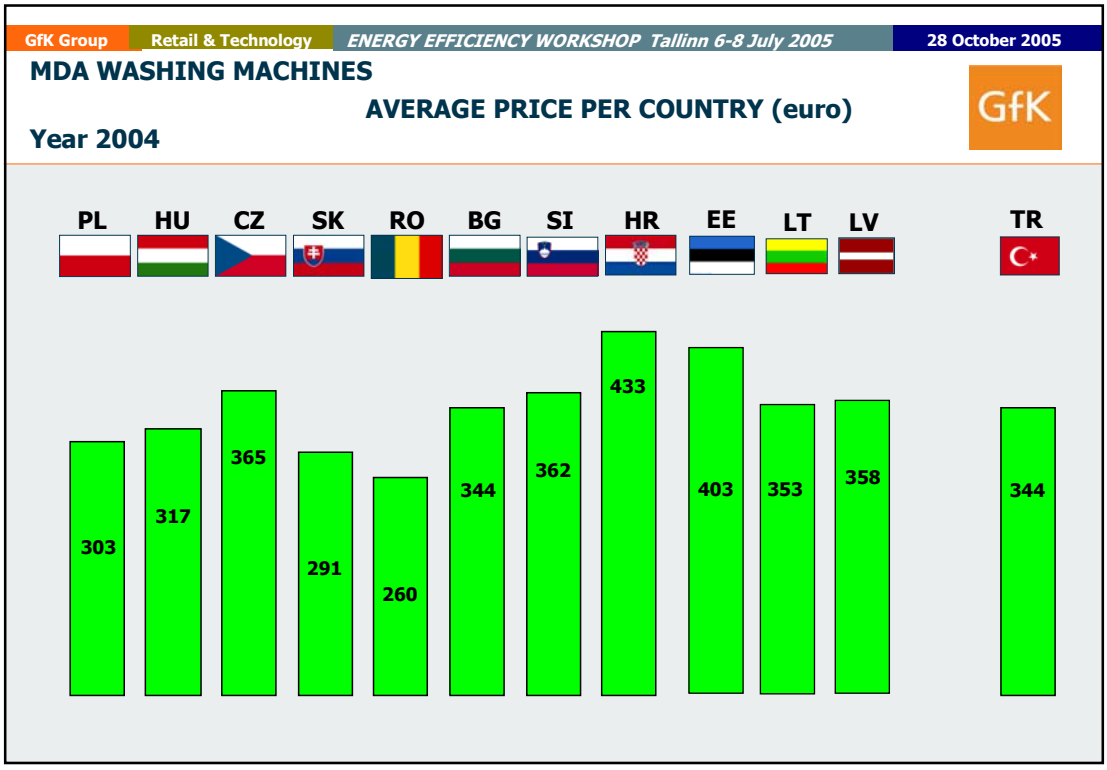
ENERGY EFFICIENCY WORKSHOP Tallinn 6-8 July 2005
28 October 2005
MDA Washing machines
Sales Units %
Year 2004
IMPORTANCE of SEGMENTS : TOP / FRONT
GfK
FRONTLOADING
TOPLOADING
OTHERS *
PL 73.1 20.7 6.1
HU 38.6 59.7 1.7
CZ 60.3 33.5 6.2
SK 35.5 53.2 11.3
RO 79.4 17.6 3.0
BG 87.1 10.9 2.0
SI 88.3 5.4 6.2
HR 84.0 9.2 6.8
EE 64.8 29.6 5.6
LT 82.4 12.2 5.4
LV 83 10.5 6.5
TR 98.9 1.1
* OTHERS= Semiautomatic + Washdryers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28 October 2005
MDA WASHING MACHINES
AVERAGE PRICE PER COUNTRY (euro)
Year 2004
GfK
PL 303
HU 317
CZ 365
SK 291
RO 260
BG 344
SI 362
HR 433
EE 403
LT 353
LV 358
TR 344

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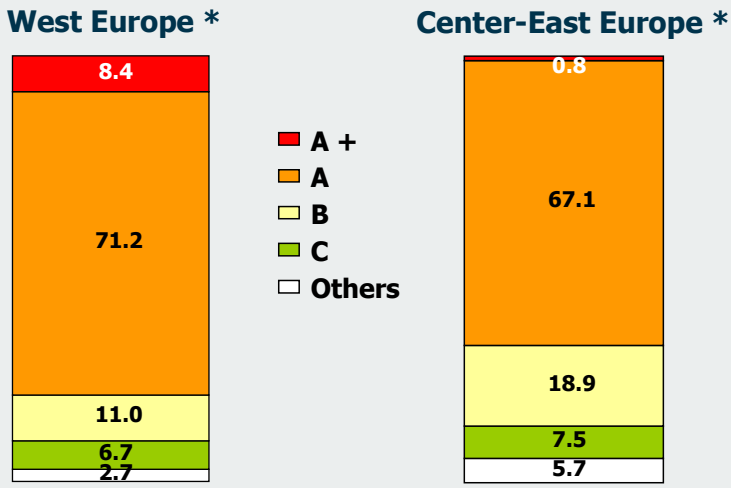
WASHING MACHINES
Sales Units %
Year 2004

IMPORTANCE OF ENERGY CLASSES



* 8 Country East: PL, CZ, SK, BG, SI, RO, HU, HR

* 10 Country West: AT, BE, DE, ES, FR, GB, IT, NL, PT, SE

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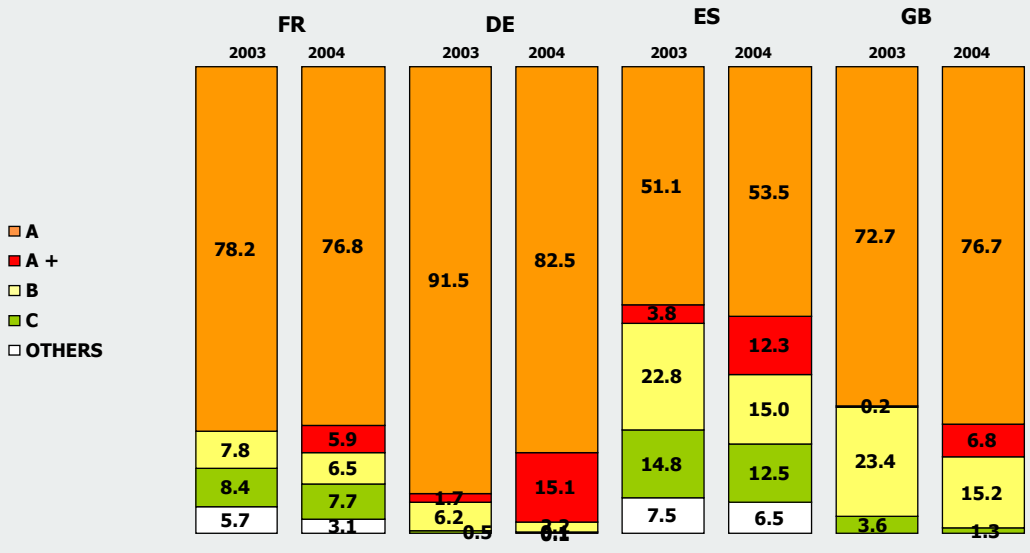
Washing Machines
Full automatic front loading (Th. Unit)
Energy class year 2003 and 2004



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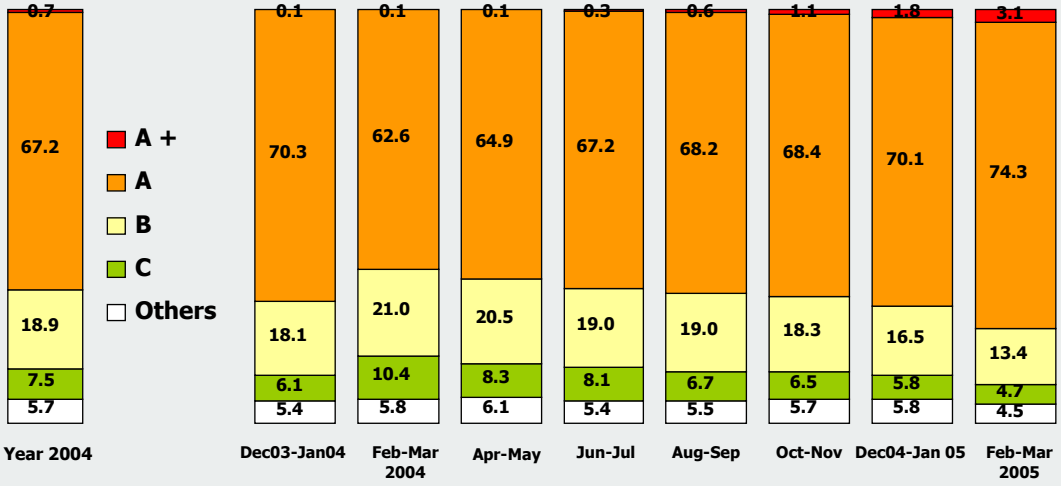
WASHING MACHINES
Sales Units %

IMPORTANCE OF ENERGY CLASSES
Evolution

8 Country Center-East Europe *



* 8 Country East: PL, CZ, SK, BG, SI, RO, HU, HR

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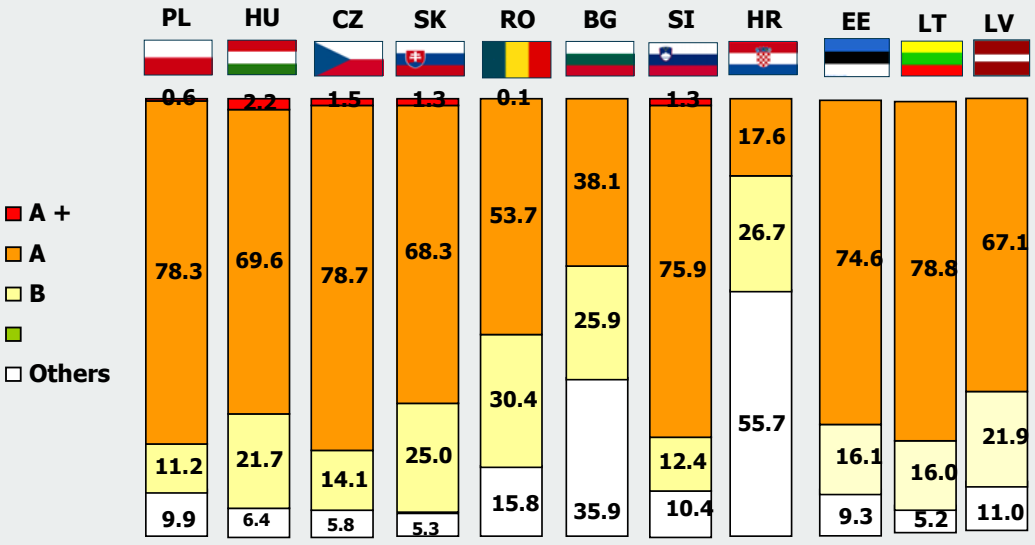
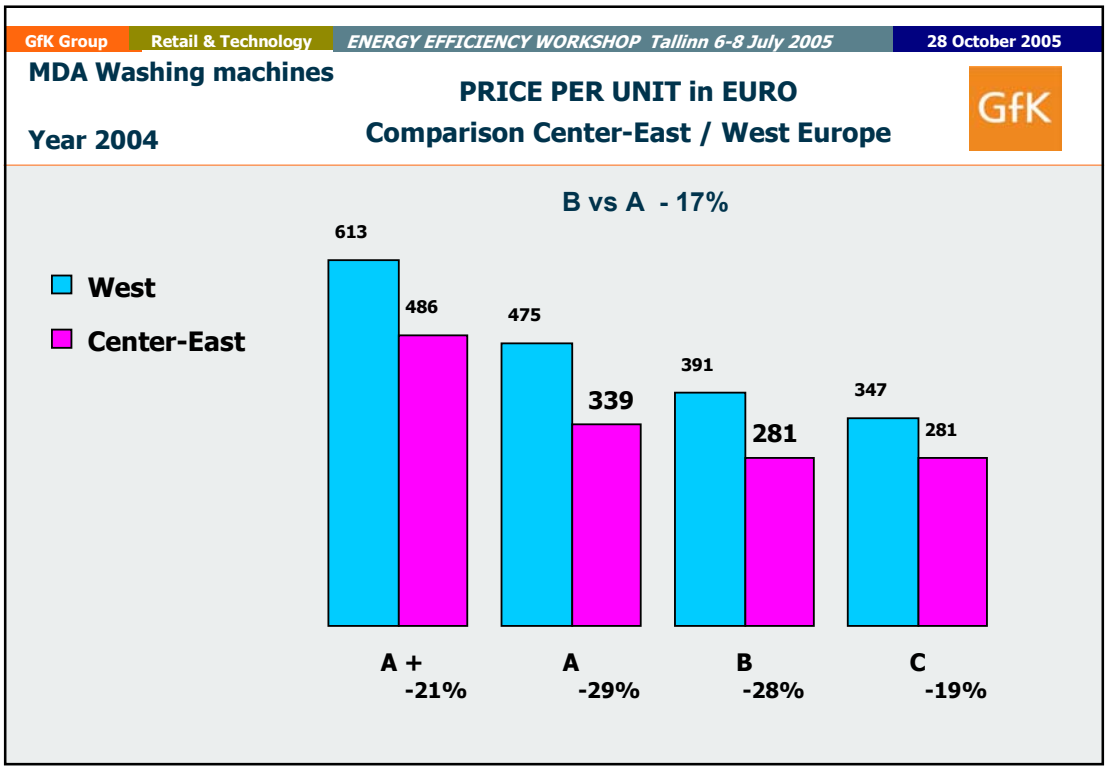
WASHING MACHINES
Sales Units %
year 2004

Importance of energy classes

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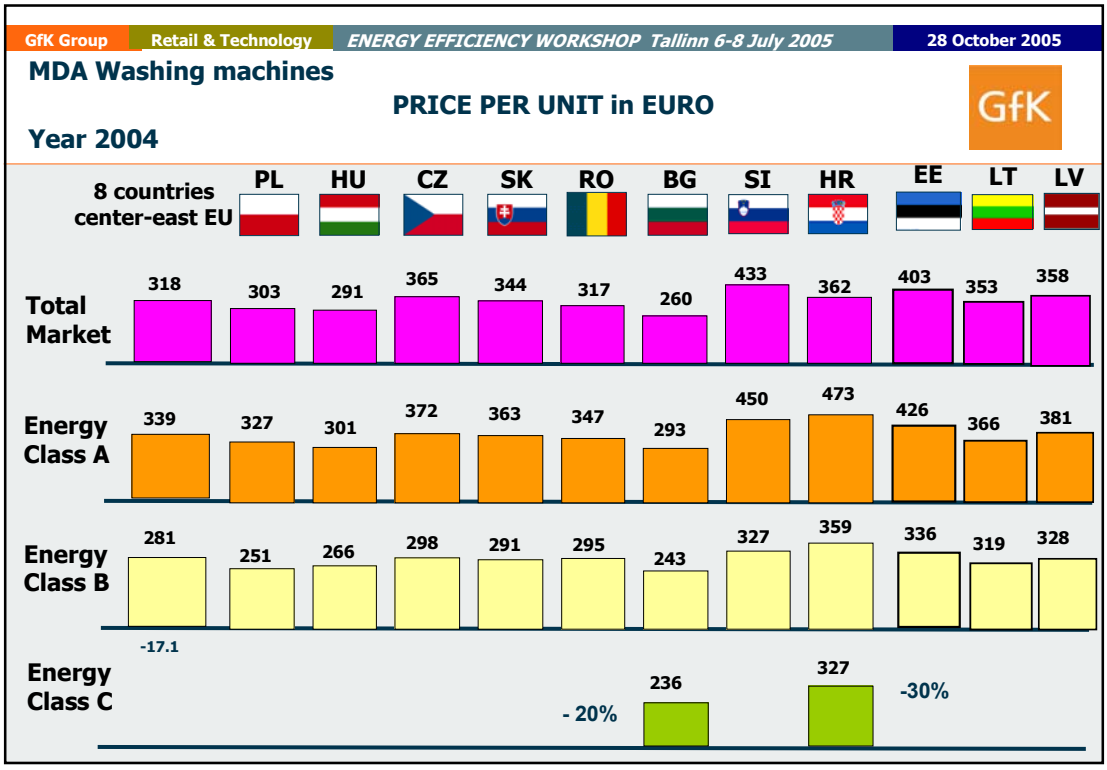
28 October 2005
MDA Washing machines
Year 2004
PRICE PER UNIT in EURO
Comparison Center-East / West Europe
GfK
B vs A - 17%
West
Center-East
613
486
475
339
391
281
347
281
A +
-21%
A
-29%
B
-28%
C
-19%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28 October 2005
MDA Washing machines
Year 2004
PRICE PER UNIT in EURO
GfK
8 countries center-east EU
PL
HU
CZ
SK
RO
BG
SI
HR
EE
LT
LV
Total Market
318
303
291
365
344
317
260
433
362
403
353
358
Energy Class A
339
327
301
372
363
347
293
450
473
426
366
381
Energy Class B
281
251
266
298
291
295
243
327
359
336
319
328
-17.1
Energy Class C
- 20%
236
327
-30%

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CENTRAL EASTERN EUROPEAN COUNTRIES *

REFRIGERATORS

Excluding Russia. Ukraine and others

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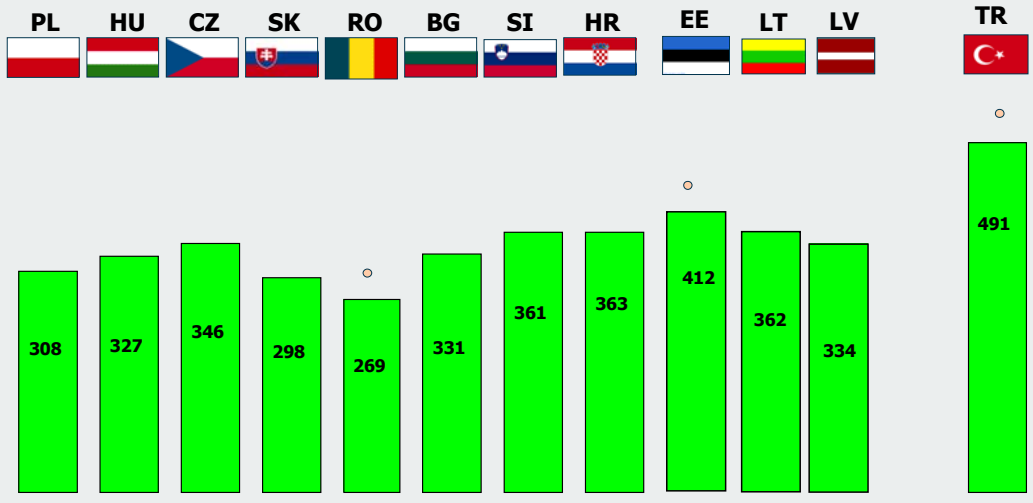
MDA REFRIGERATORS

AVERAGE PRICE PER COUNTRY (euro)

Year 2004



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CENTRAL EASTERN EUROPEAN COUNTRIES
REFRIGERATORS

1 DOOR

2 DR FREEZER BOTTOM

2 DR FREEZER TOP

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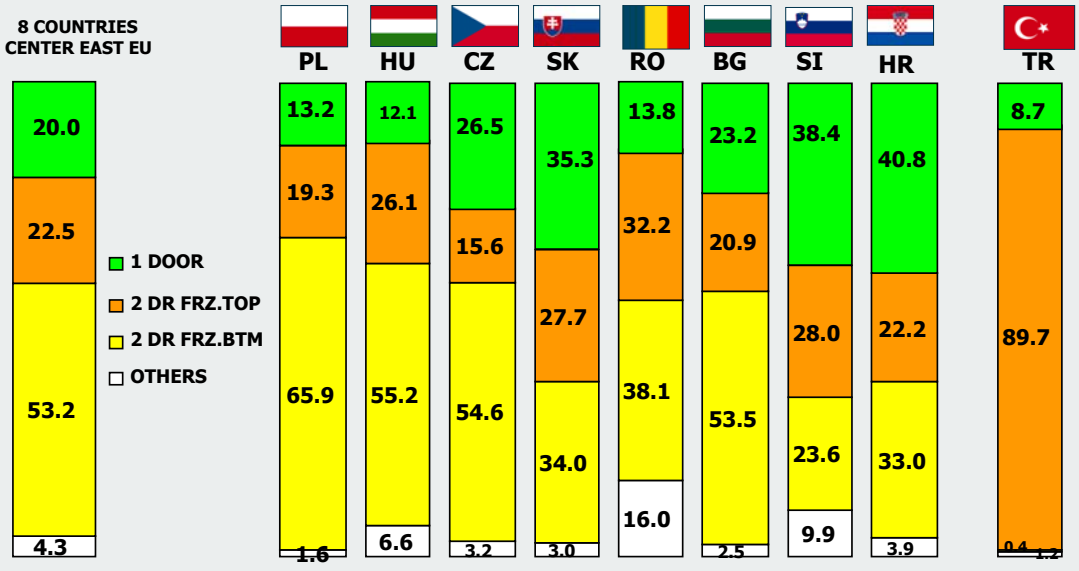
MDA_REFRIGERATORS
Sales Units %
Year 2004

IMPORTANCE OF SEGMENTS



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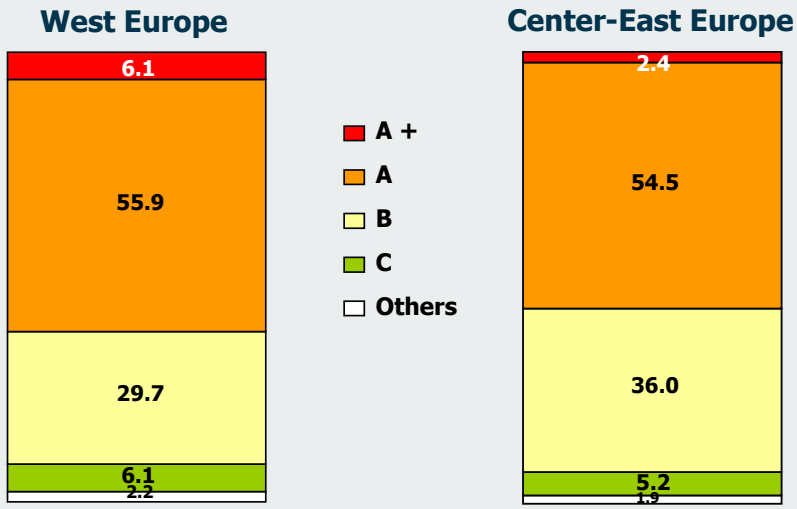
REFRIGERATORS
Sales Units %
Year 2004

IMPORTANCE OF ENERGY CLASSES



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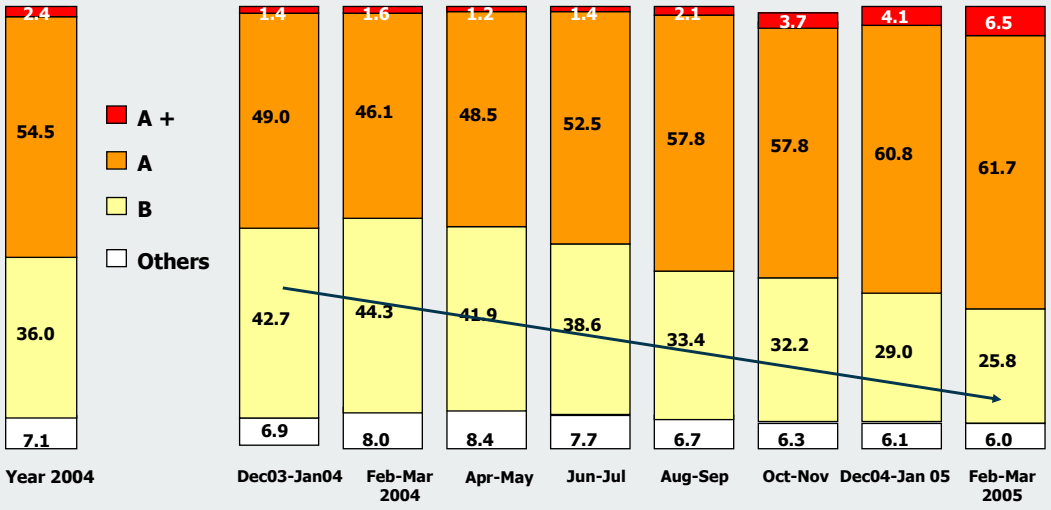
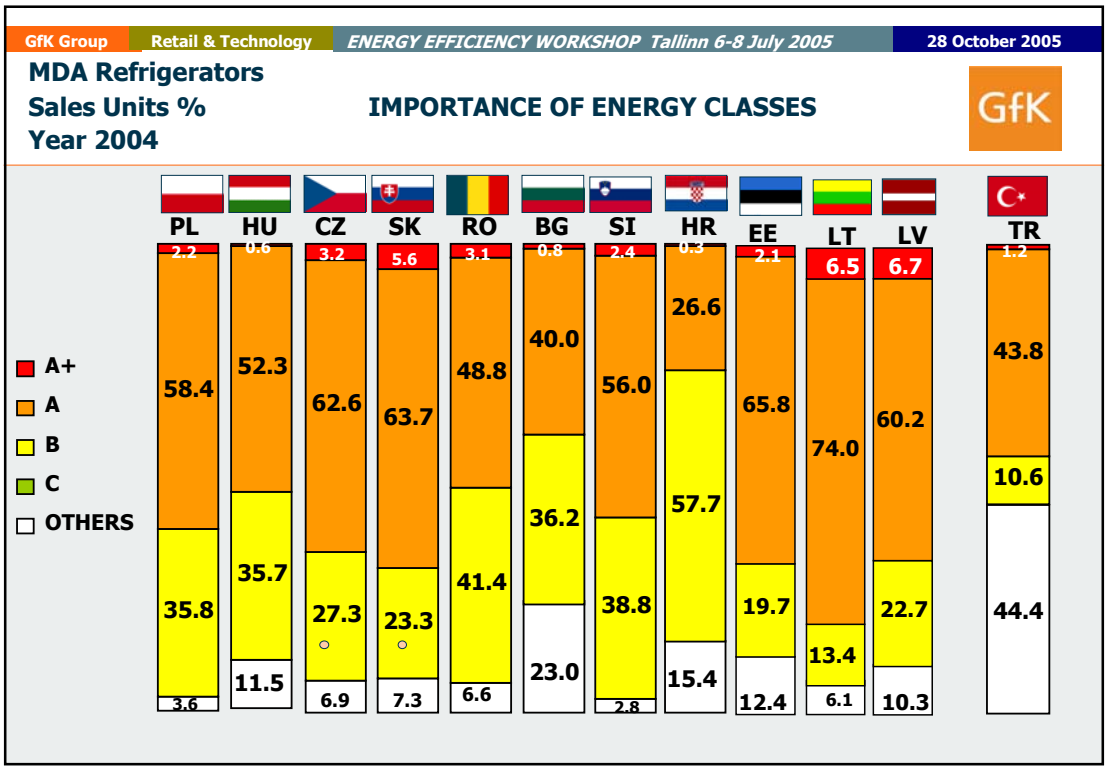
COOLING
Sales Units %

IMPORTANCE OF ENERGY CLASSES

Evolution

8 Countries Center-East Europe

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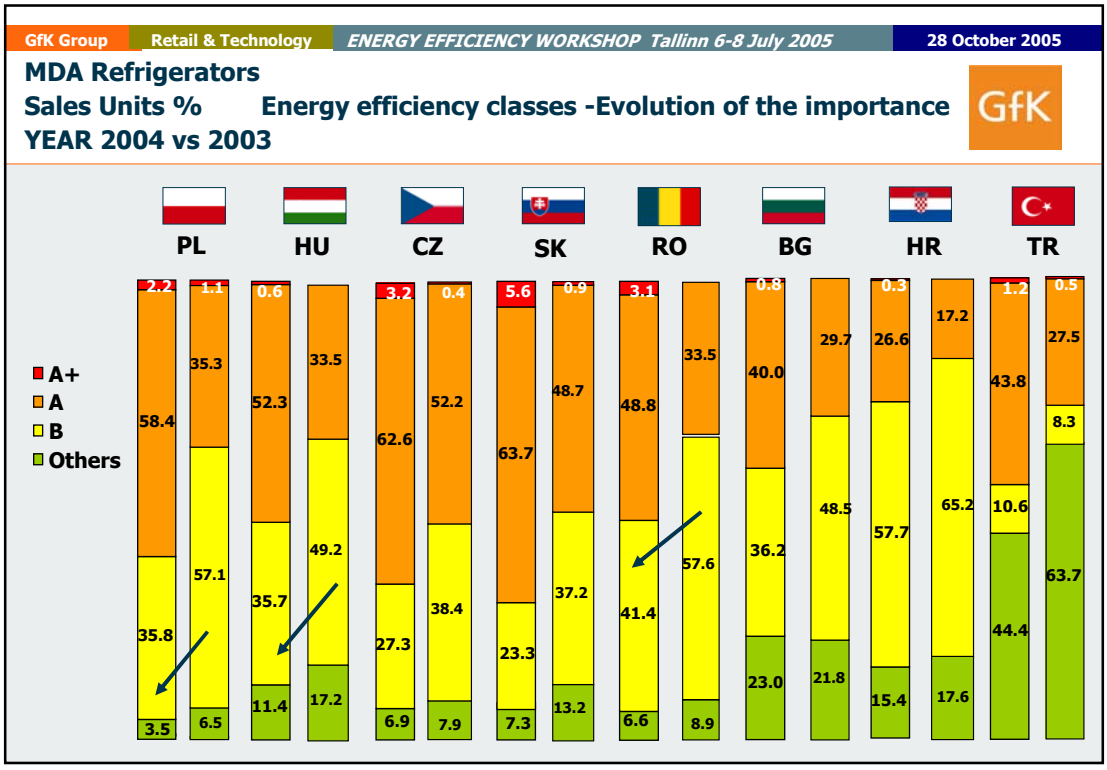
28 October 2005
MDA Refrigerators
Sales Units %
Year 2004
IMPORTANCE OF ENERGY CLASSES
GfK
A+
A
B
C
OTHERS
PL 2.2 58.4 35.8 3.6
HU 0.6 52.3 35.7 11.5
CZ 3.2 62.6 27.3 6.9
SK 5.6 63.7 23.3 7.3
RO 3.1 48.8 41.4 6.6
BG 0.8 40.0 36.2 23.0
SI 2.4 56.0 38.8 2.8
HR 0.3 26.6 57.7 15.4
EE 2.1 65.8 19.7 12.4
LT 6.5 74.0 13.4 6.1
LV 6.7 60.2 22.7 10.3
TR 1.2 43.8 10.6 44.4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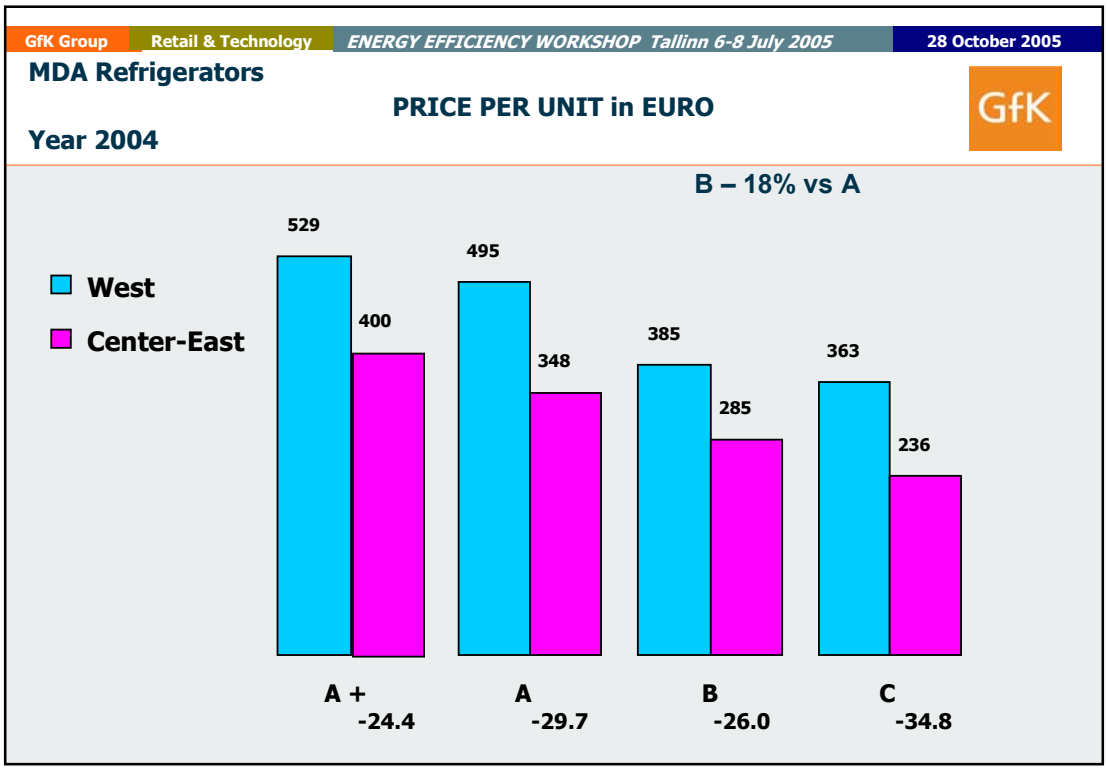
28 October 2005
MDA Refrigerators
Sales Units %
YEAR 2004 vs 2003
Energy efficiency classes -Evolution of the importance
GfK
A+
A
B
Others
PL 2.2 58.4 35.8 3.5 | 1.1 35.3 57.1 6.5
HU 0.6 52.3 35.7 11.4 | 33.5 49.2 17.2
CZ 3.2 62.6 27.3 6.9 | 0.4 52.2 38.4 7.9
SK 5.6 63.7 23.3 7.3 | 0.9 48.7 37.2 13.2
RO 3.1 48.8 41.4 6.6 | 33.5 57.6 8.9
BG 0.8 40.0 36.2 23.0 | 29.7 48.5 21.8
HR 0.8 26.6 57.7 15.4 | 17.2 65.2 17.6
TR 1.2 43.8 10.6 44.4 | 0.5 27.5 8.3 63.7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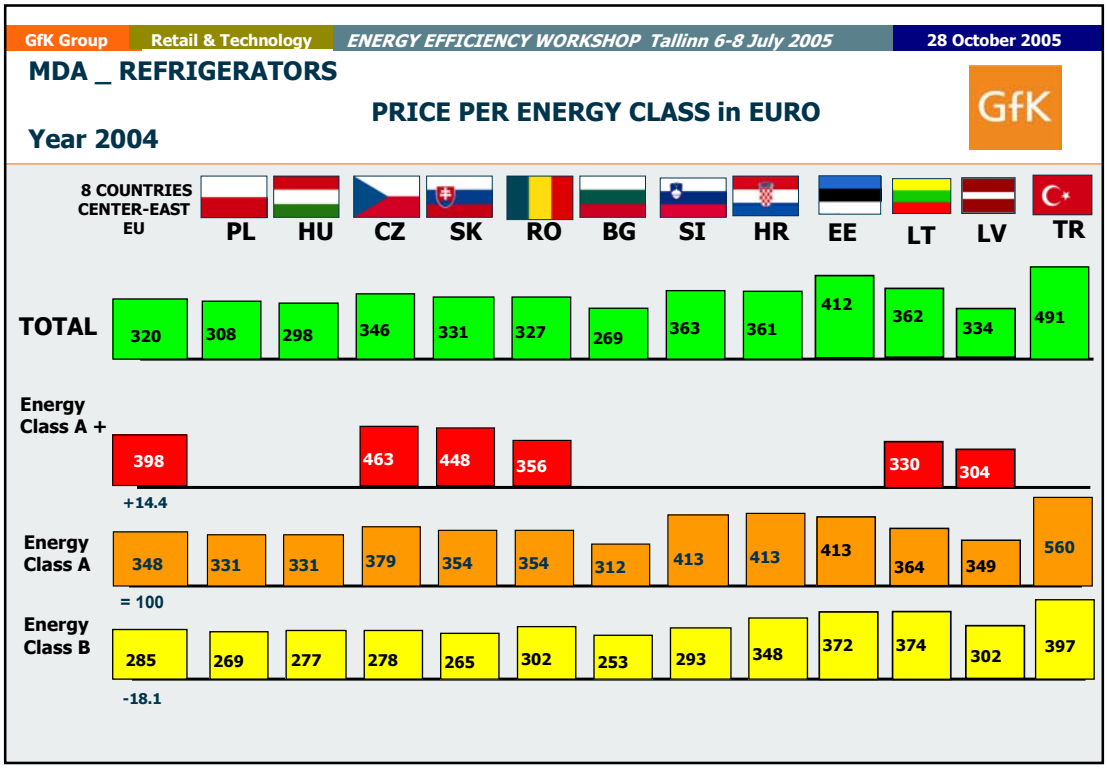
28 October 2005
MDA Refrigerators
PRICE PER UNIT in EURO
Year 2004
GfK
B – 18% vs A
West
Center-East
529
400
495
348
385
285
363
236
A +
-24.4
A
-29.7
B
-26.0
C
-34.8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28 October 2005
MDA _ REFRIGERATORS
PRICE PER ENERGY CLASS in EURO
Year 2004
GfK
8 COUNTRIES CENTER-EAST EU
PL HU CZ SK RO BG SI HR EE LT LV TR
TOTAL
320 308 298 346 331 327 269 363 361 412 362 334 491
Energy Class A +
398 463 448 356 330 304
+14.4
Energy Class A
348 331 331 379 354 354 312 413 413 413 364 349 560
= 100
Energy Class B
285 269 277 278 265 302 253 293 348 372 374 302 397
-18.1

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CENTRAL EASTERN EUROPEAN COUNTRIES*

FREEZERS

Excluding Russia. Ukraine and others

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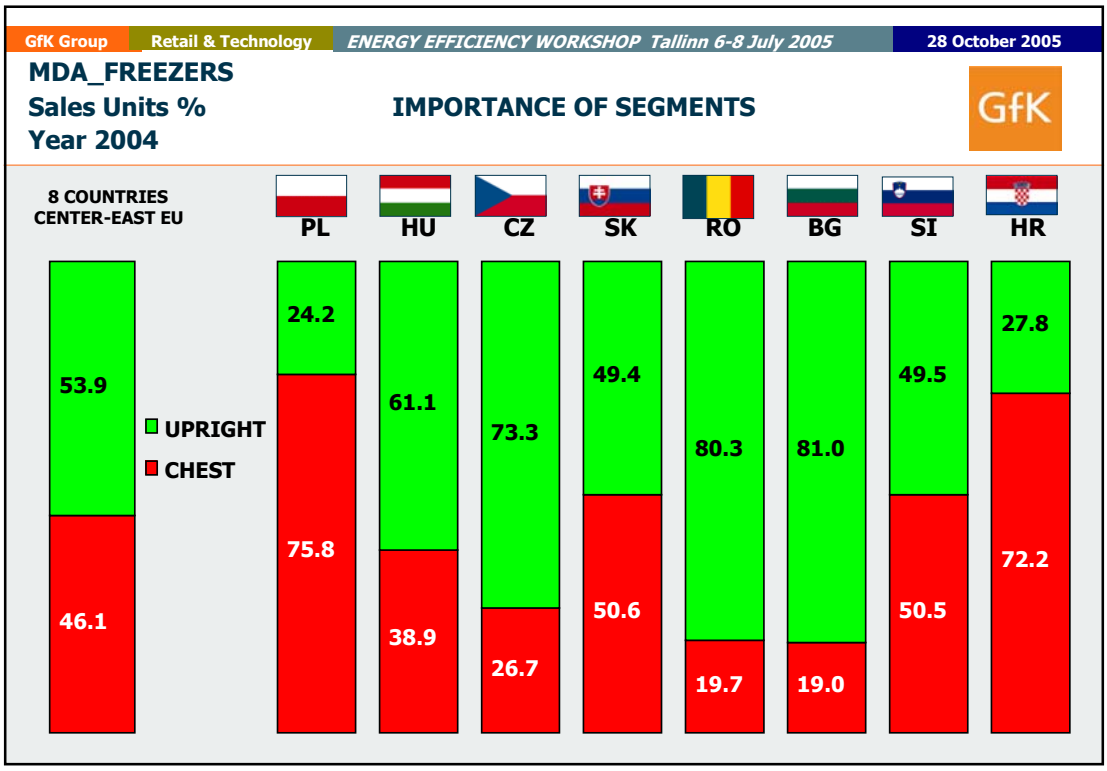
FREEZERS

CHEST

UPRIGHT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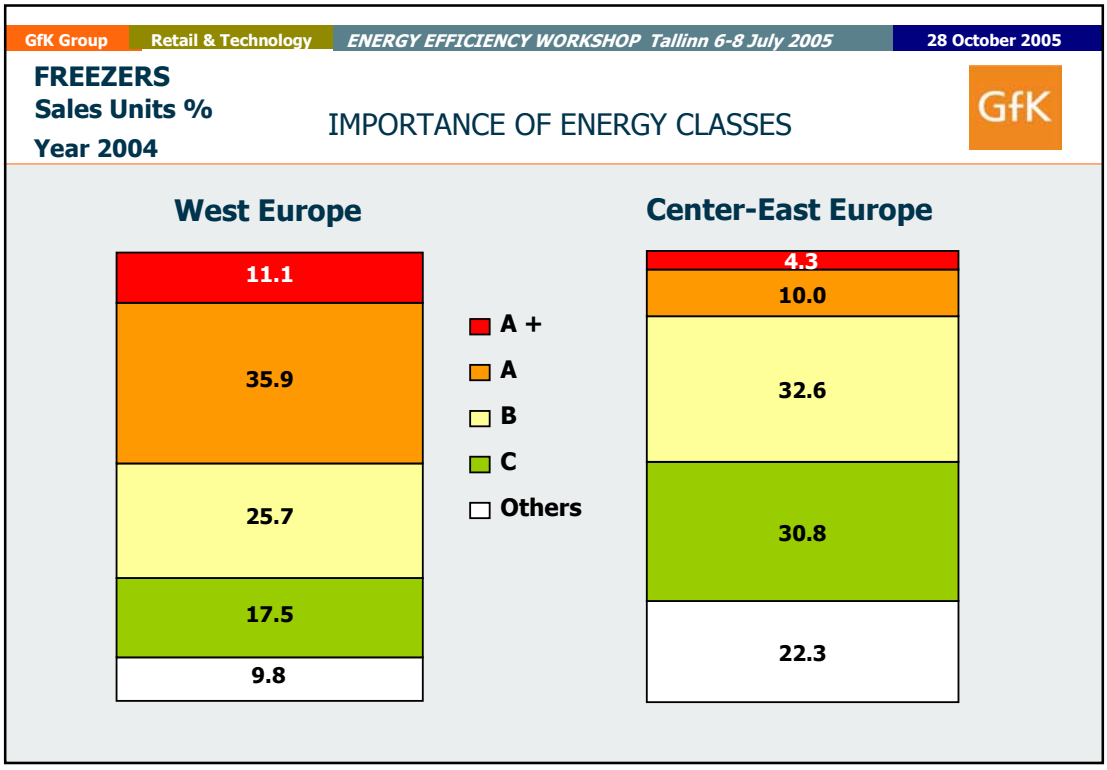
28 October 2005
MDA_FREEZERS
Sales Units %
Year 2004
IMPORTANCE OF SEGMENTS
GfK
8 COUNTRIES CENTER-EAST EU
PL
HU
CZ
SK
RO
BG
SI
HR
53.9
46.1
UPRIGHT
CHEST
24.2
75.8
61.1
38.9
73.3
26.7
49.4
50.6
80.3
19.7
81.0
19.0
49.5
50.5
27.8
72.2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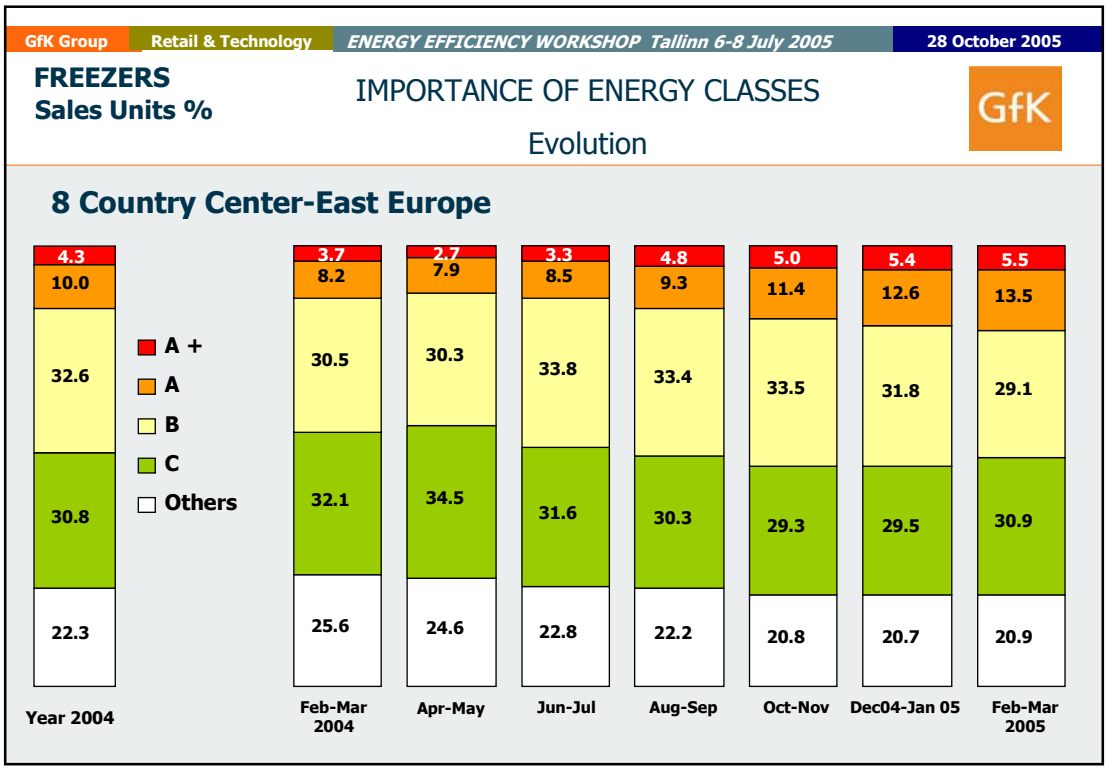
28 October 2005
FREEZERS
Sales Units %
Year 2004
IMPORTANCE OF ENERGY CLASSES
GfK
West Europe
Center-East Europe
11.1
35.9
25.7
17.5
9.8
A +
A
B
C
Others
4.3
10.0
32.6
30.8
22.3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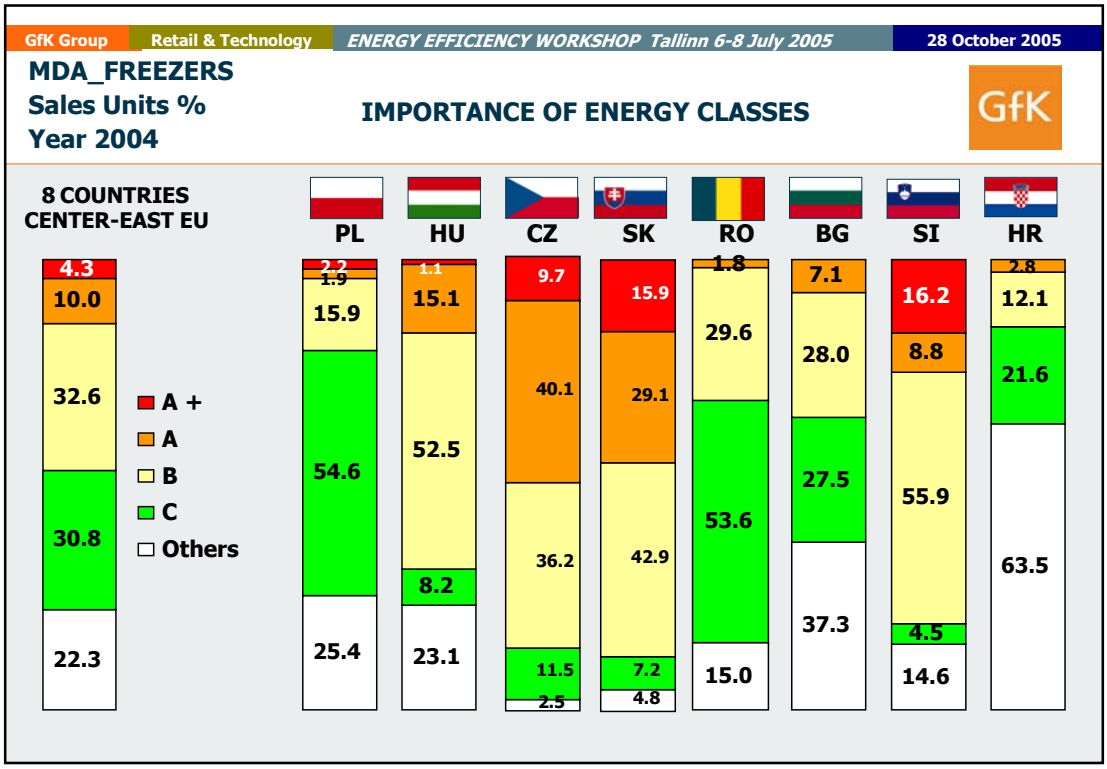
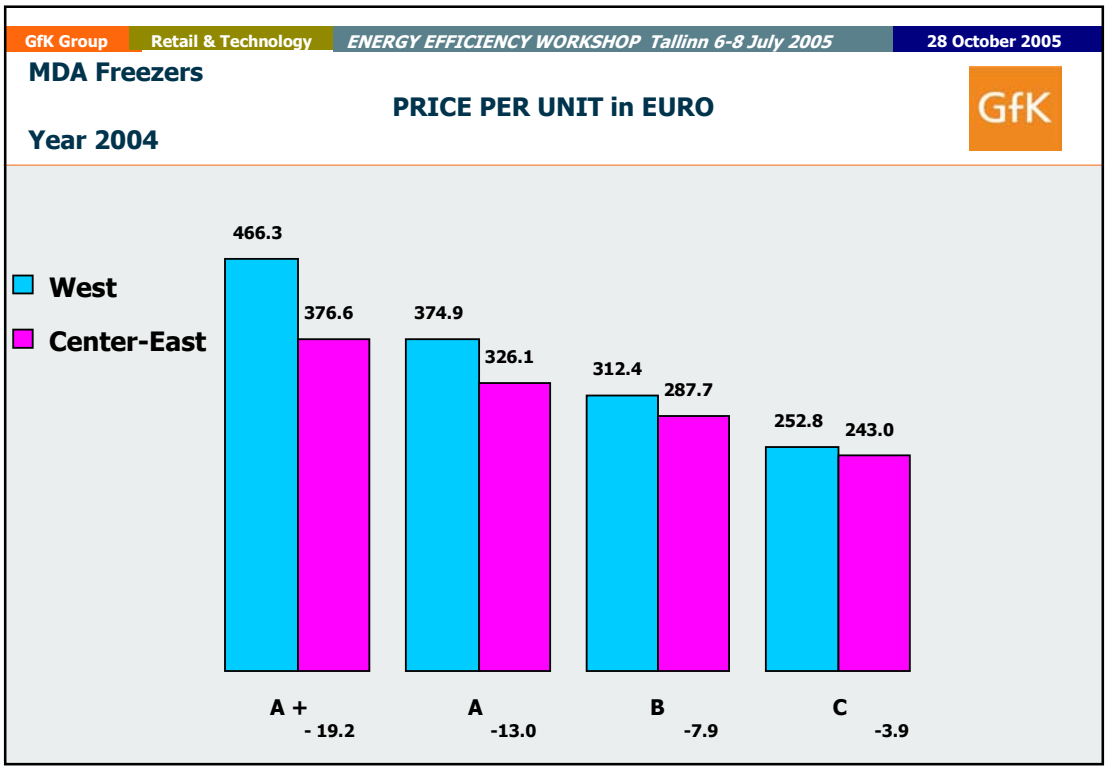
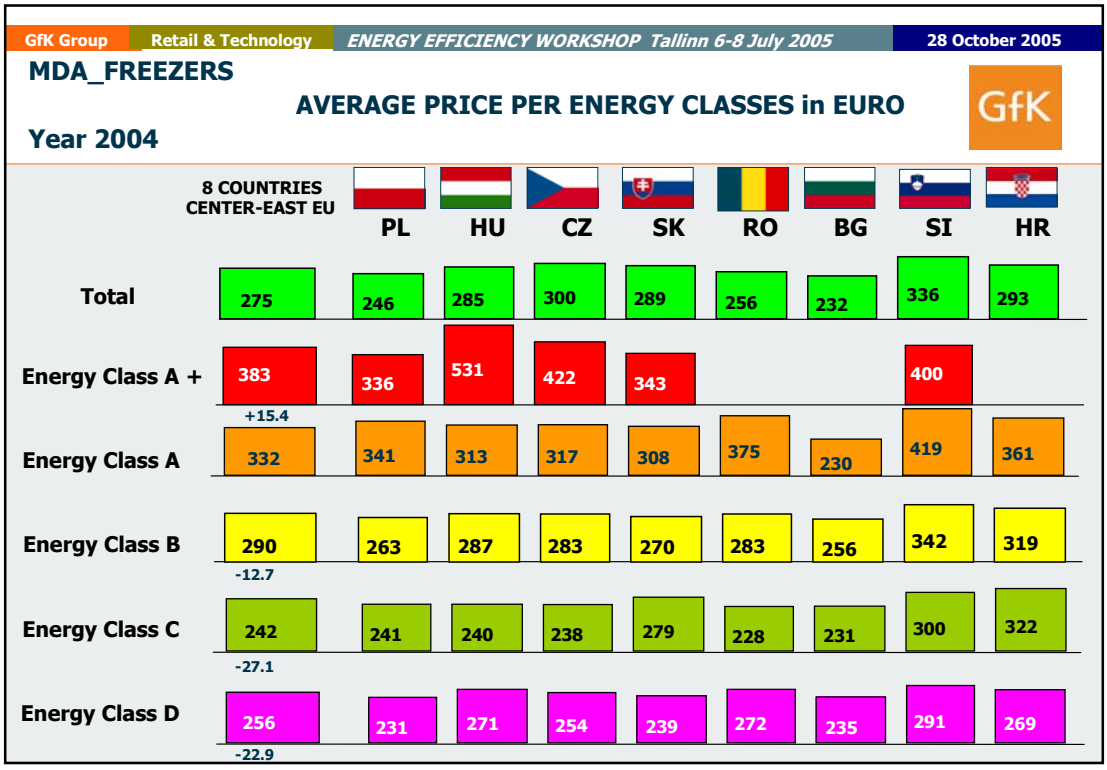
28 October 2005
FREEZERS
Sales Units %
IMPORTANCE OF ENERGY CLASSES
Evolution
GfK
8 Country Center-East Europe
A +
A
B
C
Others
Year 2004
4.3
10.0
32.6
30.8
22.3
Feb-Mar 2004
3.7
8.2
30.5
32.1
25.6
Apr-May
2.7
7.9
30.3
34.5
24.6
Jun-Jul
3.3
8.5
33.8
31.6
22.8
Aug-Sep
4.8
9.3
33.4
30.3
22.2
Oct-Nov
5.0
11.4
33.5
29.3
20.8
Dec04-Jan 05
5.4
12.6
31.8
29.5
20.7
Feb-Mar 2005
5.5
13.5
29.1
30.9
20.9


GfK Group
Retail & Technology
ENERGY EFFICIENCY WORKSHOP Tallinn 6-8 July 2005
28 October 2005
MDA_FREEZERS
Sales Units %
Year 2004
IMPORTANCE OF ENERGY CLASSES
GfK
8 COUNTRIES
CENTER-EAST EU
A +
A
B
C
Others
PL
4.3
10.0
32.6
30.8
22.3
HU
2.2
1.9
15.9
54.6
25.4
CZ
1.1
15.1
52.5
8.2
23.1
SK
9.7
40.1
36.2
11.5
2.5
RO
15.9
29.1
42.9
7.2
4.8
BG
1.8
29.6
53.6
15.0
SI
7.1
28.0
27.5
37.3
HR
16.2
8.8
55.9
4.5
14.6
2.8
12.1
21.6
63.5


GfK Group
Retail & Technology
ENERGY EFFICIENCY WORKSHOP Tallinn 6-8 July 2005
28 October 2005
MDA Freezers
PRICE PER UNIT in EURO
Year 2004
GfK
West
Center-East
466.3
376.6
374.9
326.1
312.4
287.7
252.8
243.0
A +
- 19.2
A
-13.0
B
-7.9
C
-3.9


GfK Group
Retail & Technology
ENERGY EFFICIENCY WORKSHOP Tallinn 6-8 July 2005
28 October 2005
MDA_FREEZERS
AVERAGE PRICE PER ENERGY CLASSES in EURO
Year 2004
GfK
8 COUNTRIES CENTER-EAST EU
PL
HU
CZ
SK
RO
BG
SI
HR
Total
275
246
285
300
289
256
232
336
293
Energy Class A +
383
336
531
422
343
400
+15.4
Energy Class A
332
341
313
317
308
375
230
419
361
Energy Class B
290
263
287
283
270
283
256
342
319
-12.7
Energy Class C
242
241
240
238
279
228
231
300
322
-27.1
Energy Class D
256
231
271
254
239
272
235
291
269
-22.9

GfK Group | Retail & Technology | *ENERGY EFFICIENCY WORKSHOP Tallinn 6-8 July 2005* | 28 October 2005

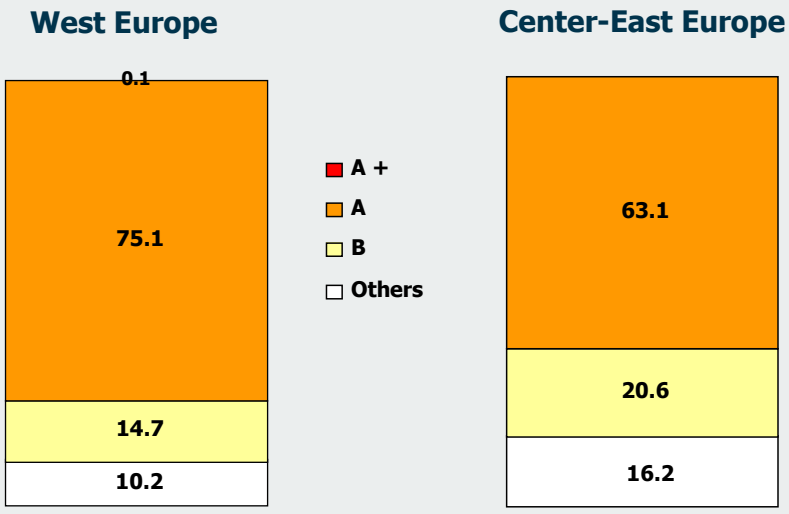
CENTRAL EASTERN EUROPEAN COUNTRIES

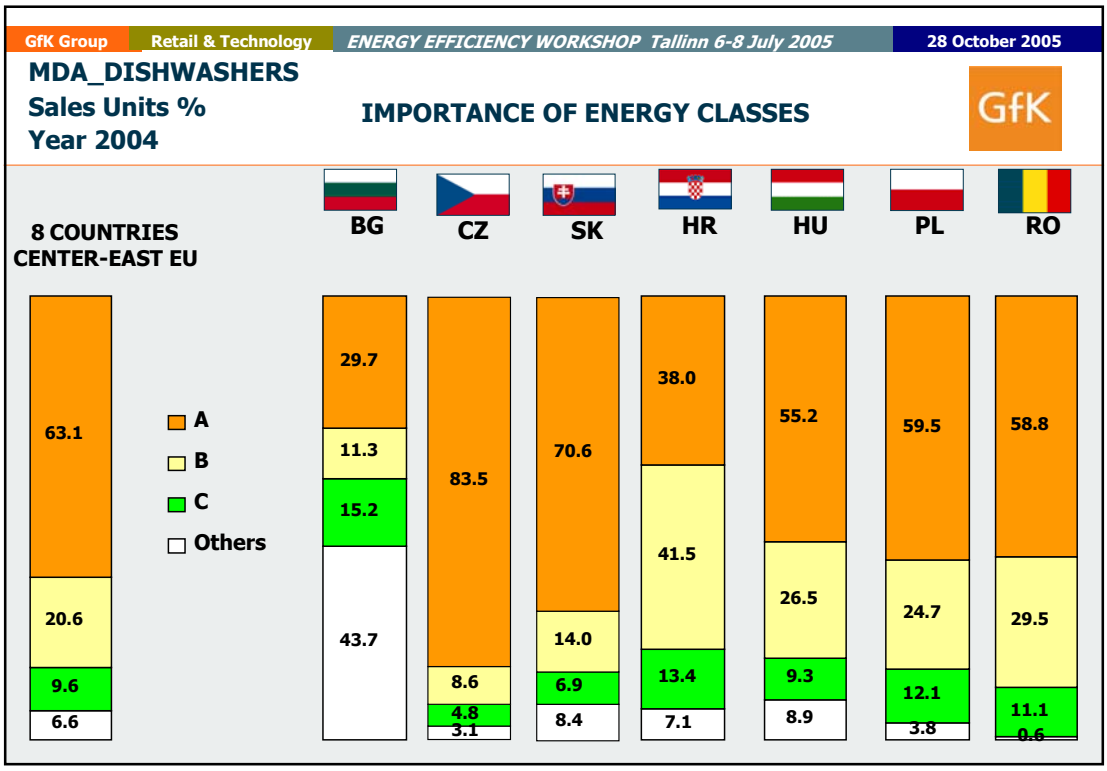
DISHWASHERS

GfK Group | Retail & Technology | *ENERGY EFFICIENCY WORKSHOP Tallinn 6-8 July 2005* | 28 October 2005

DISHWASHERS
Sales Units %
Year 2004

IMPORTANCE OF ENERGY CLASSES



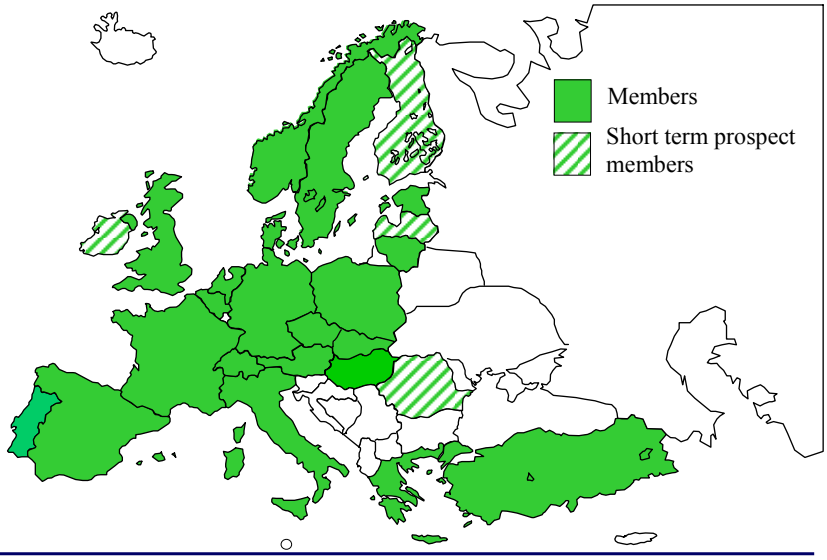

GfK Group
Retail & Technology
ENERGY EFFICIENCY WORKSHOP Tallinn 6-8 July 2005
28 October 2005
MDA_DISHWASHERS
Sales Units %
Year 2004
IMPORTANCE OF ENERGY CLASSES
GfK
8 COUNTRIES CENTER-EAST EU
BG
CZ
SK
HR
HU
PL
RO
A
B
C
Others
63.1
20.6
9.6
6.6
29.7
11.3
15.2
43.7
83.5
8.6
4.8
3.1
70.6
14.0
6.9
8.4
38.0
41.5
13.4
7.1
55.2
26.5
9.3
8.9
59.5
24.7
12.1
3.8
58.8
29.5
11.1
0.6

Energy efficiency: The European manufacturers' achievements in year 2004.

Luigi Meli - CECED director general
Tallin, July 6th 2005

1

CECED members: National Associations



2

Market transformation trends

- In spite of the very unfavourable market and economic conditions in several Member states, the Industry is in line with its Commitments.
- We have to register an almost complete lack of support from the public authorities:
  - Rebate campaigns are random and do not contribute for a permanent market transformation;
  - White certificates, where approved, are stalling;
  - It is uncertain what the Energy Service Directive will look like;
  - In most of the Member states the energy market is far from being a real market for the private users.
- In these conditions, the long term sustainibility of ambitious investment programmes is jeopardised.

3

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Unilateral Commitment on refrigerators and freezers

Participants

Amica Wronski (2004)
Antonio Merloni
Arçelik
Elco Brandt
Bosch Siemens Hausgeräte
Candy
Electrolux
Fagor
Gorenje
Iar Siltal (2004 – art.11 proced.)
Indesit Company (Merloni Elettrodom.)
Liebherr
Miele
Snaige (2005)
Vestfrost
Whirlpool Europe

5

Content summary

To phase out all class C and above products from 1.1.2005
(Class D upward fro chest freezers).

To achieve a minimum individual fleet consumption of 55 in year 2006.

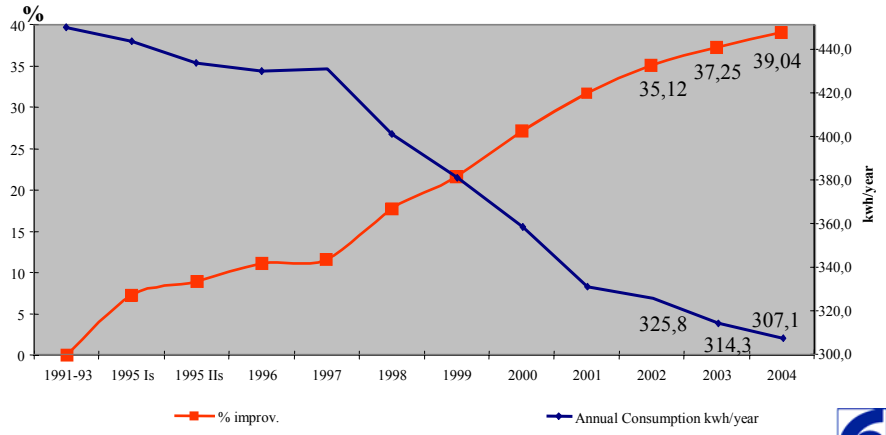
Index of 57 anyhow committed even in absence of market transformation support programmes.

6

Two significant thresholds

In July 2005 cold appliances are likely to achieve two significant thresholds:

- 40% of improvement compared to energy label baseline;
- Annual average consumption lower than 300 kwh/year.



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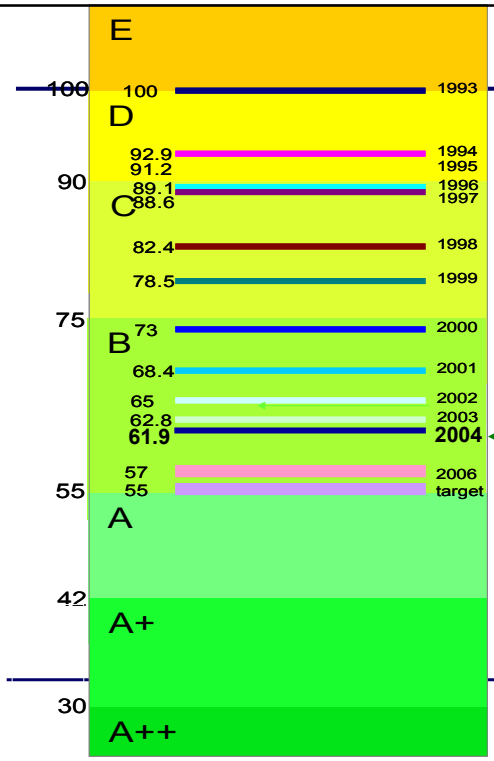
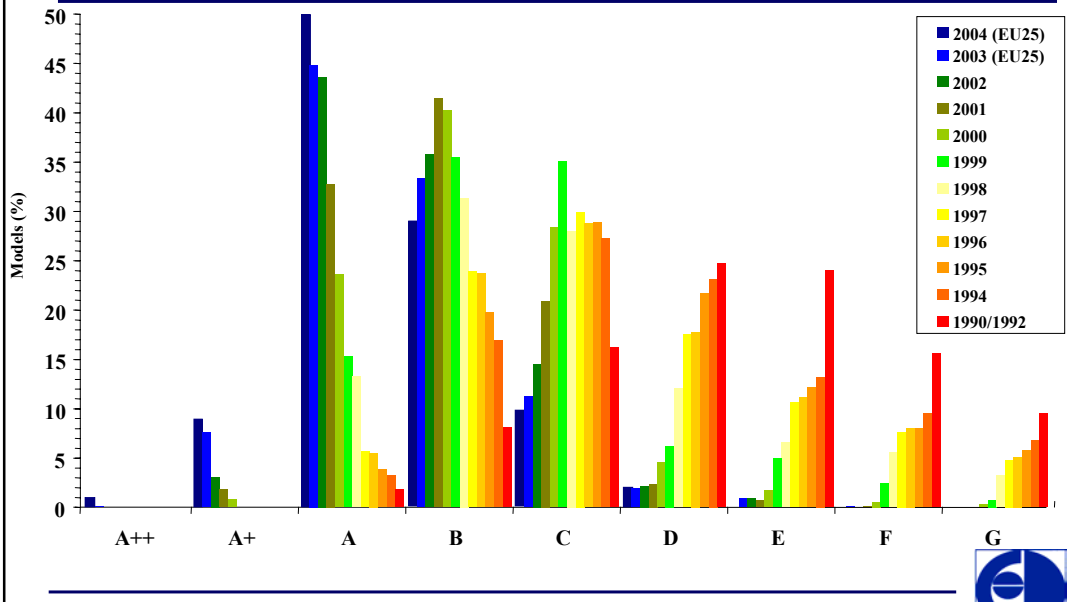


Four star (7)	61%	56.5
Refrigerators (1)	13%	60.6
Vertical freezers (8)	14%	63.0
Horizontal freezers (9)	7%	73.0
Others	5%	~72.0

9.6% Models to be phased out in January 2005

1,390 over 14,428

1992 – 2004 evolution



9

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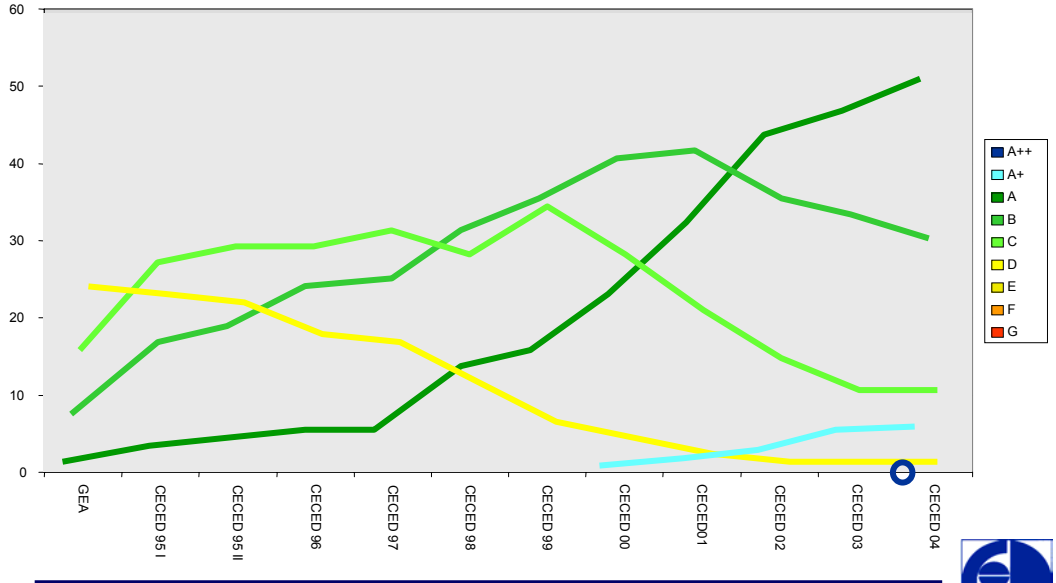
Cold appliances EU (15)25 – evolution trends



10

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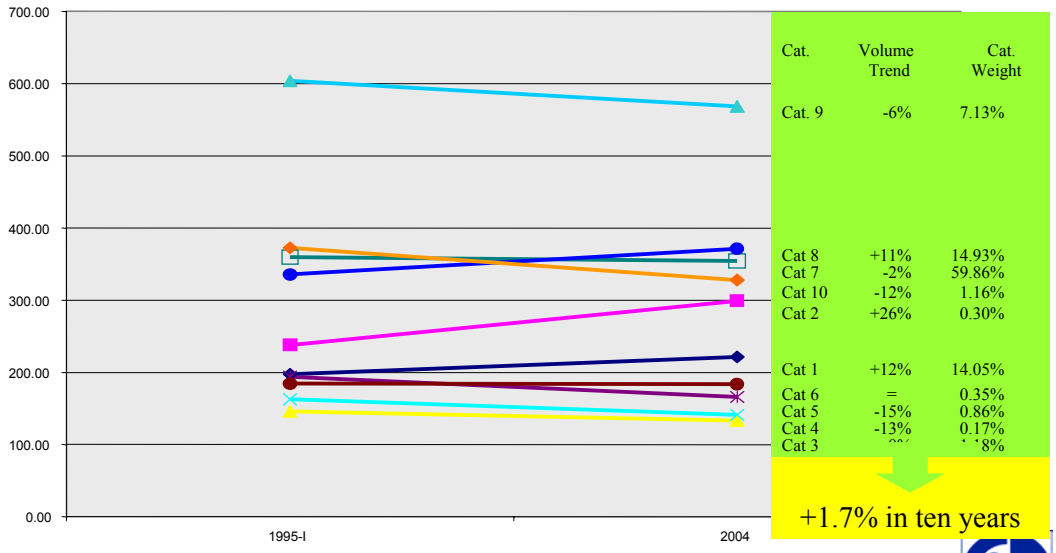
Ten year adjusted net volumes trend



11

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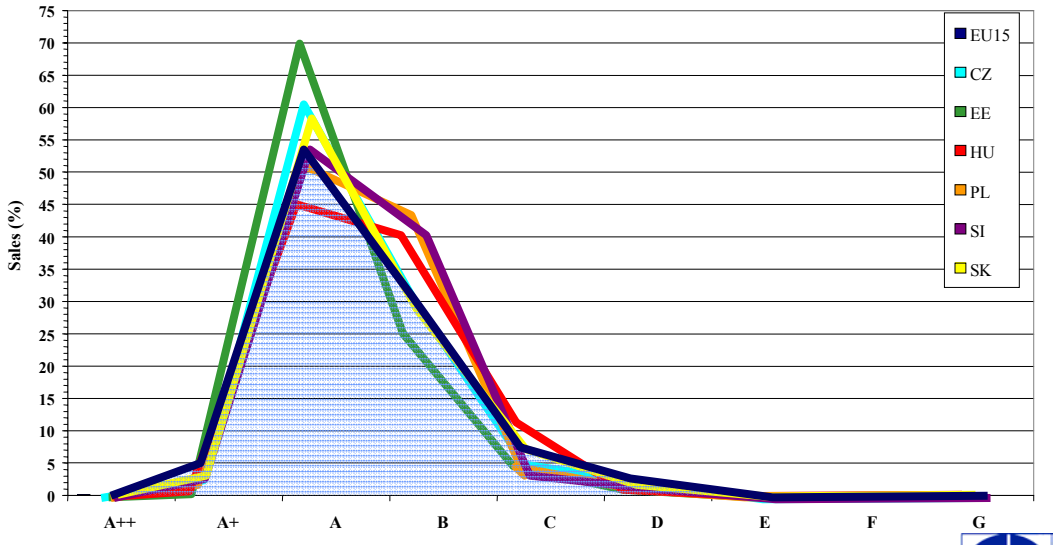
2003 Sales of refrigerators in some new member states



12

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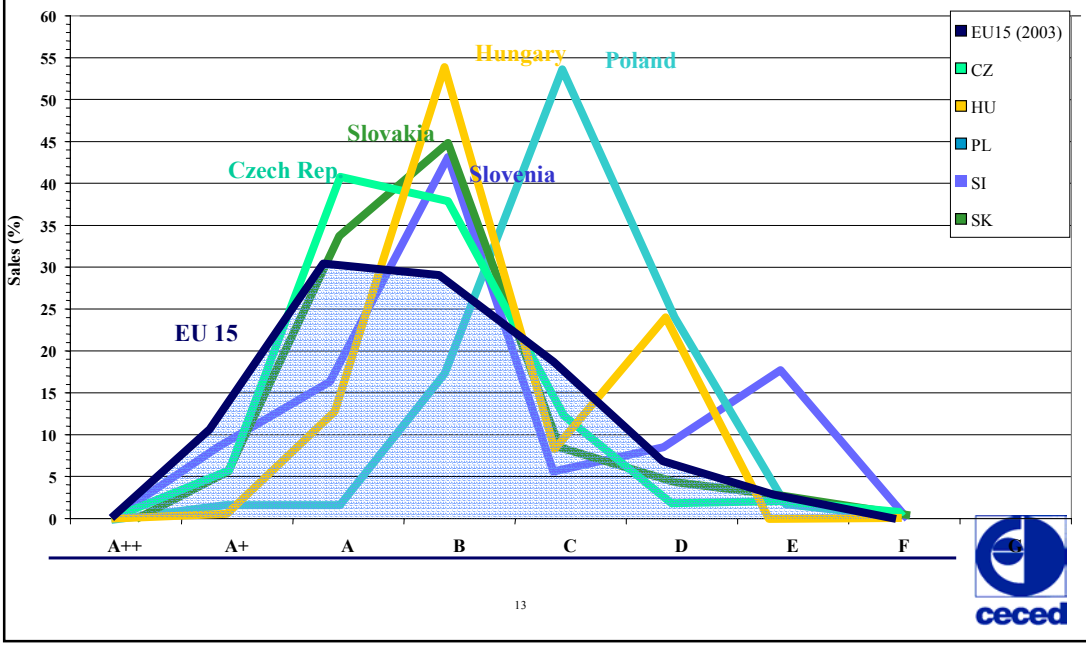
2003 Sales of freezers in some new member states



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Unilateral Commitment on washing machines

Participants

Amica Wronski (2004)	Electrolux
Antonio Merloni	Fagor
Arçelik	Gorenje
Elco Brandt	Indesit Company
Bosch Siemens Hausgeräte	Miele
Candy	Whirlpool Europe

15

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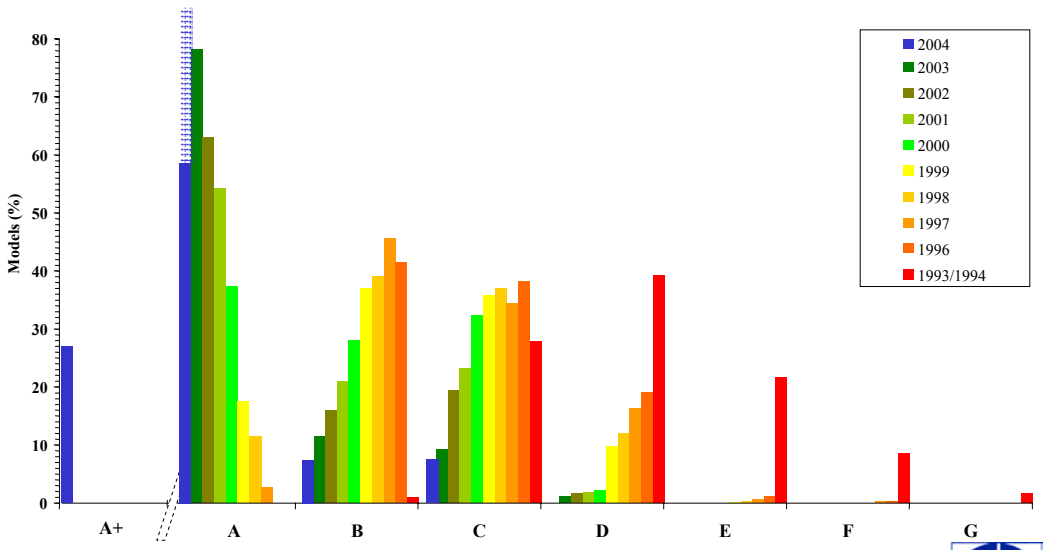
EU15 Washing machines efficiency evolution 93-04



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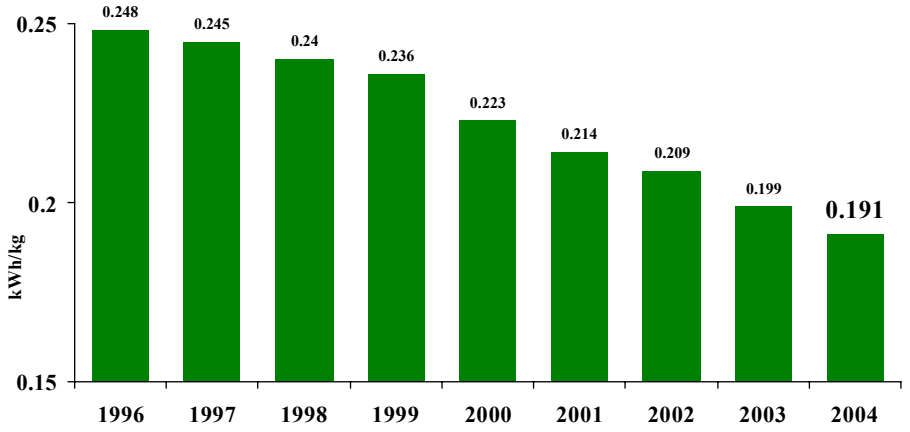
EU15 Average washing machine energy consumption



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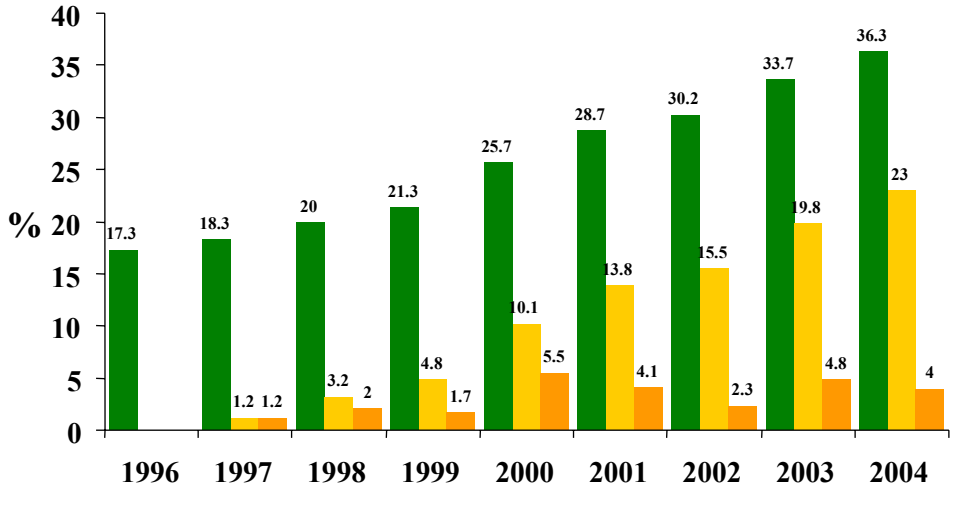
EU 15 Washing machines efficiency trends 1996 -2004



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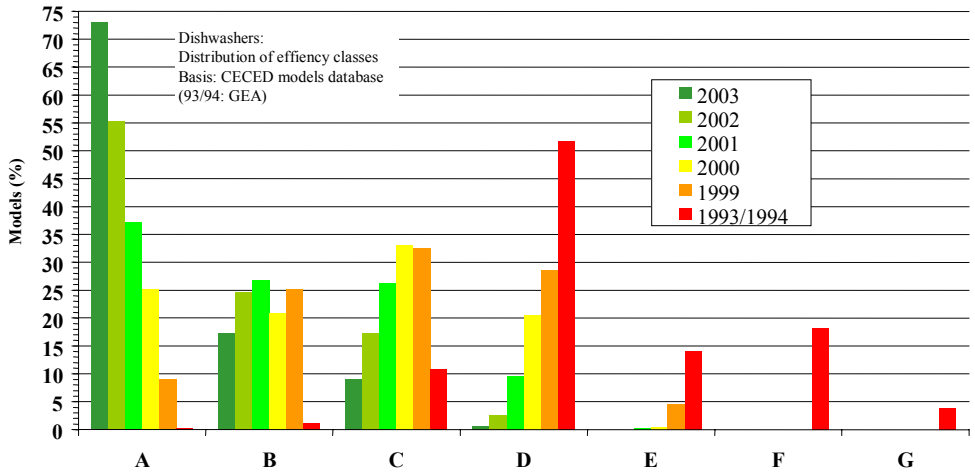
Dishwashers energy efficiency improvements



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CECED	*Luigi Meli* *Alain Vanlanduyt*	*secretariat@ceced.org*

EUROPEAN LAMP COMPANIES FEDERATION

-EUP -
Energy Using Product Directive

Tallin, 06.07.2005

Piotr Podsiadło
Philips Lighting

Aura Light · BLV · Leuci S.p.A. · GE Lighting · NARVA · OSRAM GmbH · Philips Lighting · SLI

EUROPEAN LAMP COMPANIES FEDERATION

Energy Using Product Directive
an opportunity for Europe

- What is this ?

1. 175 Million Trees
2. 1 Billion Euro
3. High Pressure Mercury Lamp
4. 19 Million Barrels of Oil

EUROPEAN LAMP COMPANIES FEDERATION

Energy Using Product Directive
an opportunity for Europe

- What is this ?

When replaced by better lamps:

1. Fewer trees / CO2 emission
2. Less energy cost
3. Phase out this lamp
4. Less oil needed

ELC HV12605 EUP Directive – EUEW 10-06-2005. Page 3

EUROPEAN LAMP COMPANIES FEDERATION

The Environment
What is it all about ?

Waste Mercury CO2
Manufacturer Liability EUP
Landfilling
Energy Prices Oil Price
WEEE Lead RoHS
Recycling Lifetime
Global Warming End of Life
Greenpeace Cost Impact Kyoto
Legislation Customer Needs

ELC HV12605 EUP Directive – EUEW 10-06-2005. Page 4

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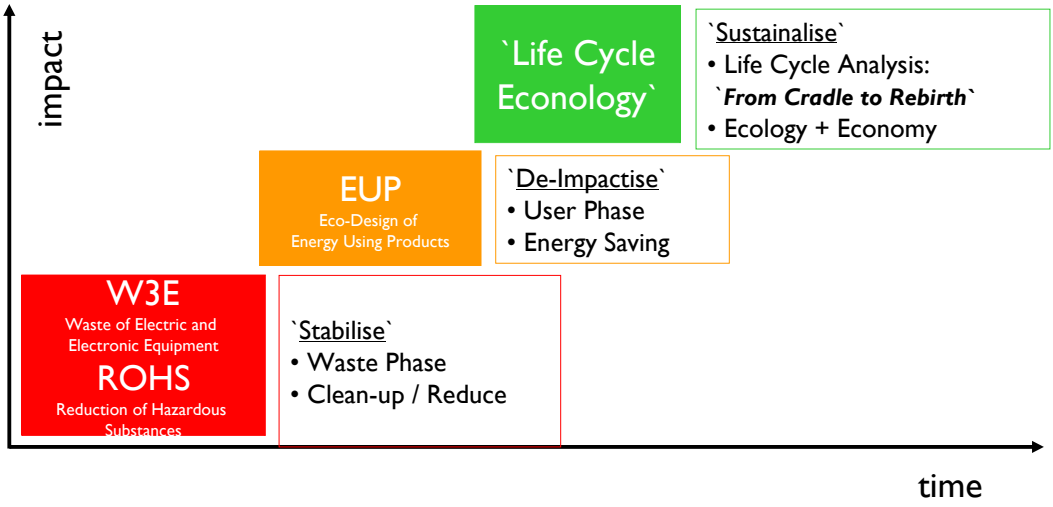
Environmental Legislation
Roadmap impacting Business



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Scope of the EuP

It is essential that the EU can intervene on the demand side by making efficient use of energy wherever possible.' (Explanatory Memo EUP)

"The scope for energy savings lies mainly in the following equipment sectors"

- Heating and water heating equipment
- Electric motor systems
- **Lighting in the both the domestic & tertiary sectors**

24 Mt CO_2 (15% of total)

EUROPEAN LAMP COMPANIES FEDERATION

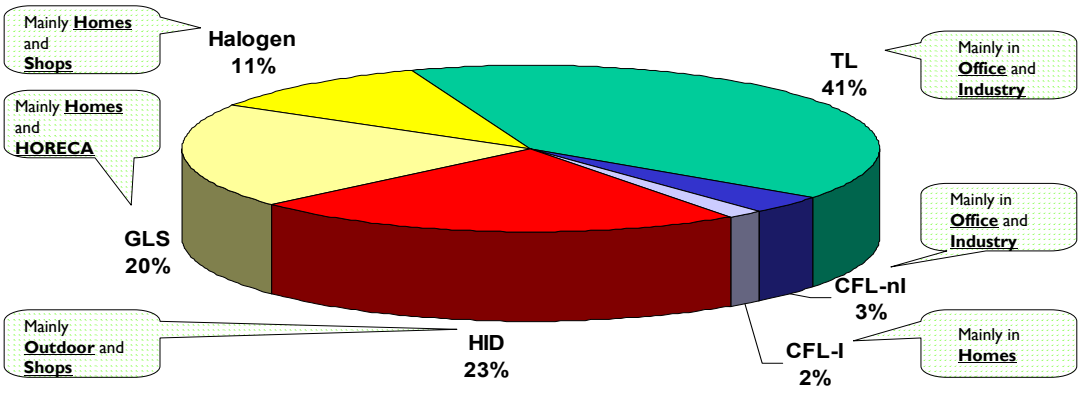
What is 24 Mton CO_2 ?

EUP-target : 24 Mton CO_2/yr
=> annual consumption of 1.2 billion trees
=> 30,000 km² land planted each year
=> 85% of Holland each year

EUROPEAN LAMP COMPANIES FEDERATION

CO_2 emission from burning fossil fuels for Power Generation used by *Lighting*

Draft for discussion



W-Europe - Power Consumption Lighting 426 *10⁶ kWh

- **80% Professional Lighting**
- **20% Consumer Lighting**

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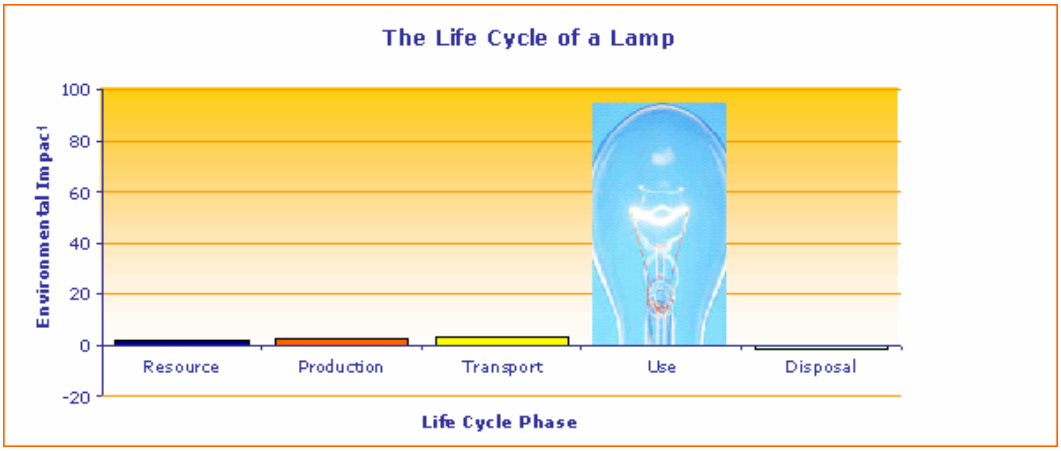
The Life Cycle of a Lamp
The User Phase most relevant



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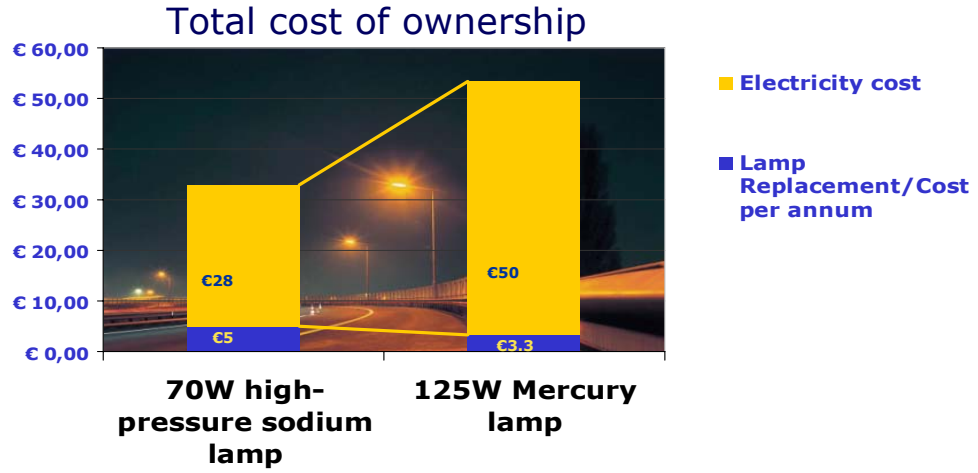
Efficient Street Lighting
Saves Money



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Page 10

EUROPEAN LAMP COMPANIES FEDERATION

Making a switch

A 500W street lamp, if lit for 7 hours a day (during the hours of darkness) can single-handedly produce up to 2 tonnes of CO_2 a year – enough to fill two hot air balloons 10 metres in diameter, or fill 5 double decker buses!

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Streetlighting
HPL and its alternatives

HPL = High Pressure Mercury (55 lm/W)

↓

- High Pressure Sodium (105 lm/W)
- Ceramic Metal Halide (120 lm/W)

High Pressure Sodium and Ceramic Metal Halide are the most suitable alternatives

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Page 12

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The 2 Key Bottlenecks
How to meet 2010 targets ?

1. Overcoming Initial Cost
   - Better Lamps: Budget issues ?
   - Pay-back through Total Cost of Ownership
2. Cost of Conversion
   - `Evolutionary` Renovation rates are too slow:
     - Street-lighting : 20 to 30 years (3% p.yr.)
     - Offices : 10 to 12 years (7 to 10% p.yr.)
     - Shops : 5 to 10 years (10 to 15% p.yr.)

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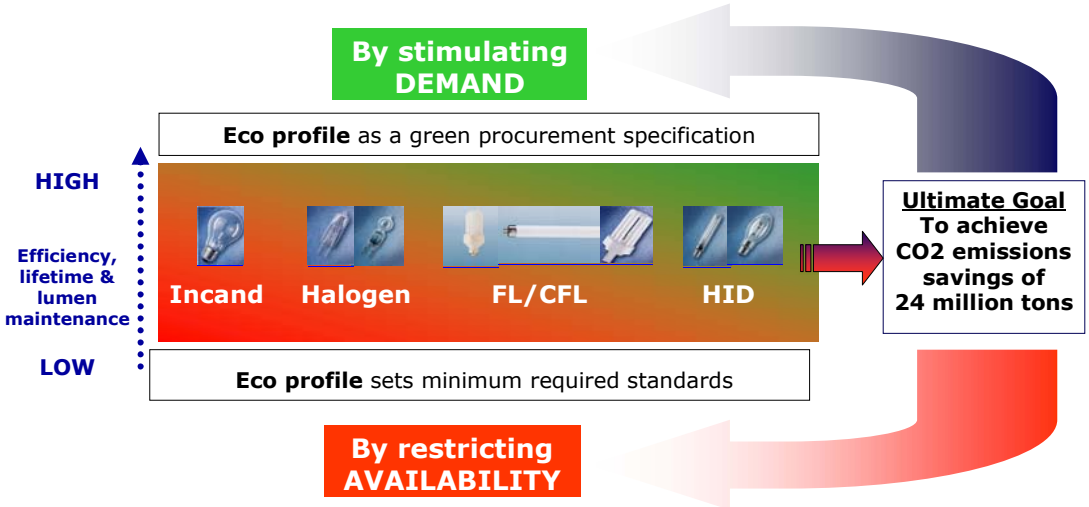
EUROPEAN LAMP COMPANIES FEDERATION

Making the Shift
2-tier Lobby Focus



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EUROPEAN LAMP COMPANIES FEDERATION

Overcoming obstacles

By providing some of the following fiscal incentives to public purchasers European governments can in turn make energy efficiency an integral part of the internal market through:

- **Tax rebate programmes for all municipalities and authorities who make the switch to energy efficient outdoor and street lighting**
- **Incentives for upgrades for outdoor and street lighting systems that are more than 15 years old**
- **Leasing programmes for the latest energy efficient outdoor and street lights**
- **(Interest free) loans for energy efficient outdoor and street lighting projects**
- **Financial incentives for the promotion of local energy efficient outdoor and street lighting projects**
- **Provisions for private sector initiation of public private partnerships (PPPs) for outdoor and street lighting services**

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ELC Position in Lobby Documents

- Shared ELC Position Paper on EUP Directive
- `Switch` Roadmap & 4 `Did You Know` papers

Piotr PODSIADŁO , Lamps C&EE

EUROPEAN LAMP COMPANIES FEDERATION

Conclusions

1. The **Kyoto** targets **can be reached** for Lighting
   - 80% of CO_2 emissions from professional applications
   - The more efficient products already exist
2. The EUP Directive is a **Triple Win**
   - Lower Cost & Better Lighting for End-Users
   - Less CO2 and Competitive Industry for Europe
   - More Added Value Products for Manufacturers & Trade

➢ People; Planet; Profit

PHILIPS

Lighting Trends and Developments

Tallin, 06.07.2005

PHILIPS

Solid State Lighting – looking into the future

Piotr PODSIADŁO , Lamps C&EE

PHILIPS

Recent lamps developments
Professional lighting - indoor

PHILIPS

MASTER TL-D Super 80 – Xtra - Xtreme

MASTER TL-D Super 80
(12,000 hour service life*):
- Areas with low ceilings
- Where maintenance costs are not abnormally high.

MASTER TL-D Xtra
(24,000 hour service life*):
- With medium-high ceilings where lamps are difficult to get at
- Relamping causes expensive disruption.

MASTER TL-D Xtreme
(40,000 hour service life*):
- With high ceilings where lamps are particularly difficult to get at
- Where relamping costs are very high
- Where the cost of disruption is abnormally high.

Lighting Trends and Developments 6-7-2005 5

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MASTER TL-D Xtra & Xtreme reference project

Customer:	**République et Canton du Jura. Section Route Nationale**
Country:	**Switzerland**
Type of application:	**Tunnel A16 (Du Mont Russelin + Galerie Develier)**
Lamp type and volume:	**MASTER TL-D Xtra, 1300 pcs**
Prior product in the installation:	**GE**
Customer reason(s) to choose MASTER TLD Xtra/Xtreme:	**Longer maintenance cycles, operational cost saving**
Application photo's (if available):	 

Lighting Trends and Developments 6-7-2005

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MASTER TL5

PHILIPS

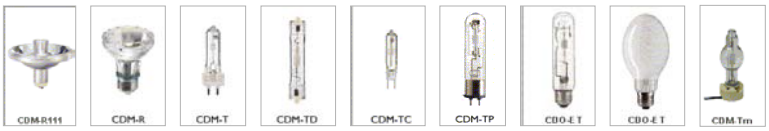
MASTER Colour Elite

One light source, unlimited possibilities

PHILIPS

MASTER Colour Elite

- Dimmable CDM system.
- Increased lumen output.
- Improved lumen maintenance.
- Improved colour rendering.



Lighting Trends and Developments 6-7-2005 9

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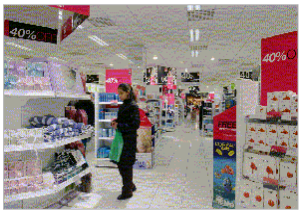
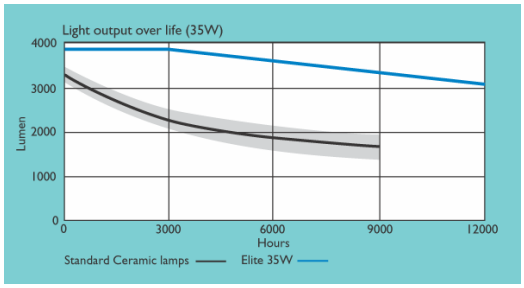
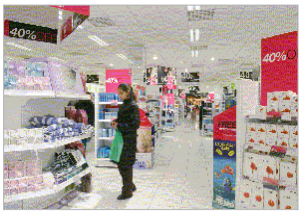
Higher Lumen Maintenance

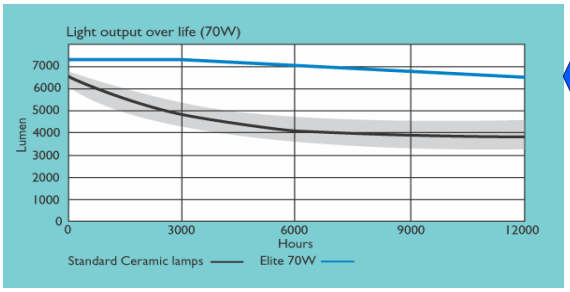


Standard Ceramic
after 4000 hrs





MASTER Colour Elite
after 4000 hrs



Lighting Trends and Developments 6-7-2005

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Recent lamps developments
Professional lighting - outdoor

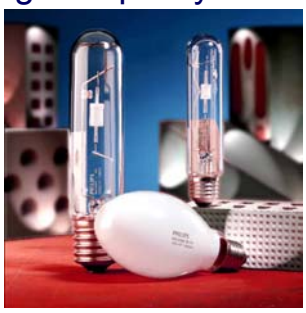
PHILIPS

MASTER City White CDO-TT/-ET

White light for better atmosphere in our cities and towns.

It's the easiest and cheapest uplamping solution for SON. Like its predecessor, the highly successful MASTER Colour City, it directly replaces high-pressure sodium lamps in existing luminaires to bring the benefits of good-quality white light to our towns and cities.

CDO stands for Ceramic Discharge Outdoor and offers you improved warm white colour properties and dimmability



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MASTER City White
Applications

Outdoor Lighting:

- City & Shopping centres
- Pedestrian Areas
- Illumination
- Decorative Street Lighting
- Residential Areas

PHILIPS

MASTER City White

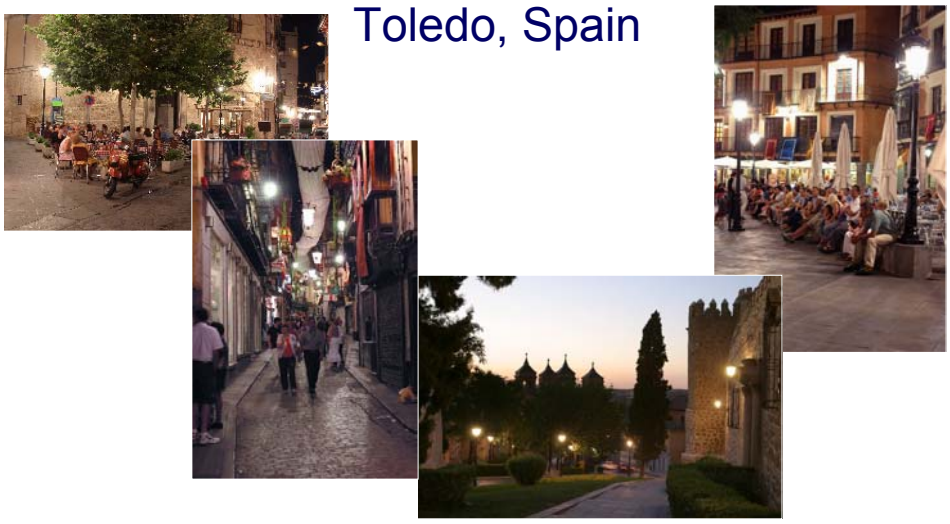
Benefits

- Reduced cost of ownership (via lifetime) compared to predecessor MASTER Colour City CDM-TT
- Comfortable warm colour impression (2800K) with stable colour over lifetime, CRI Ra>80
- Optimal performance on Philips PrimaVision fixed output electronic gear
- Flexible light levels and reduced energy consumption possible via (electronic) dimming option
- Direct upgrade from yellow SON light to white light, upgrade for existing HPL installations with gear exchange

PHILIPS

Pilot Projects
MASTER City White

Toledo, Spain



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CosmoPolis

The Foundations of Change

PHILIPS

A New Generation of Public Lighting Lamp Systems

30's	60's	00's
SOX + TL	SON + HPL	CosmoPolis

Lighting Trends and Developments 6-7-2005 17

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Benefits

CosmoPolis

CosmoWhite

CosmoGold

+ system energy efficacy
+ optical efficiency
+ system size
+ gear lifetime
+ dimmability

CosmoWhite

+ colour – White Light

➢ *Official Green Flagship of Philips Lighting*

PHILIPS

The best environmental products

Green Flagships

A green flagship outperforms competition on at least 2 of the green focal areas [>10%] and is equal in the rest.

Better choice for the environment products

Products marked as „Better choice for the environment" have the best environmental performance in their product range.

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Application

Urban Public Lighting

- City Centers
- Residential Areas
- Roads & Tunnels

Floodlighting

- Public buildings, monuments, parks & squares
- Industrial and commercial buildings

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Positioning

CosmoWhite and CosmoGold

	Difference
1. Compared to SON:	
- smaller size	-50%
- higher energy efficacy	+10%
- better optical efficiency	+5%
2. Compared to MASTER Colour:	
- higher energy efficacy	+30%
- better lumen maintenance	+25%
- longer lifetime	+50%
- better optical efficiency	+5%
3. Compared to HPL:	
- far better on all aspects	

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CosmoPolis in Existing Luminaires

Benefit by renovating old (esp. post top heritage) luminaires

- High efficacy leads to brighter installations and energy saving
- Long, reliable life means lower and more predictable maintenance costs
- White light means user friendly, pleasant ambiance

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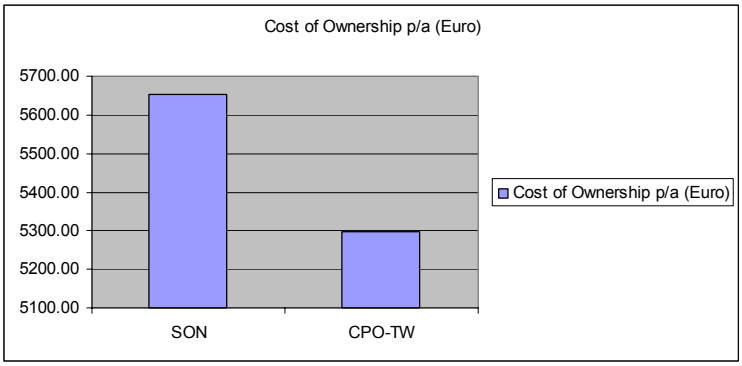
Total Cost of Ownership Example



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Total Cost of Ownership Example

Annual running costs of a 150W MASTER SON-T Installation compared with 140W CPO-TW Installation

Burning Hours (h)	4000		
Cost of Electricity (Euro)	0.1		
Cost of Planned Replacement Labour (Euro)	7.5		
	SON-T	**CPO-TW**	
Lamp Replacement Interval (Years)	4	3	
Lamp Cost (Euro)	12.5	45	
System Power (kW)	0.171	0.151	
Number of Luminaires for 3km road	77	68	
	SON	**CPO-TW**	**Average Saving**
Cost of Ownership p/a (Euro)	5651.80	5297.20	354.60

Based on 3km road, 7m wide, 9m mounting height

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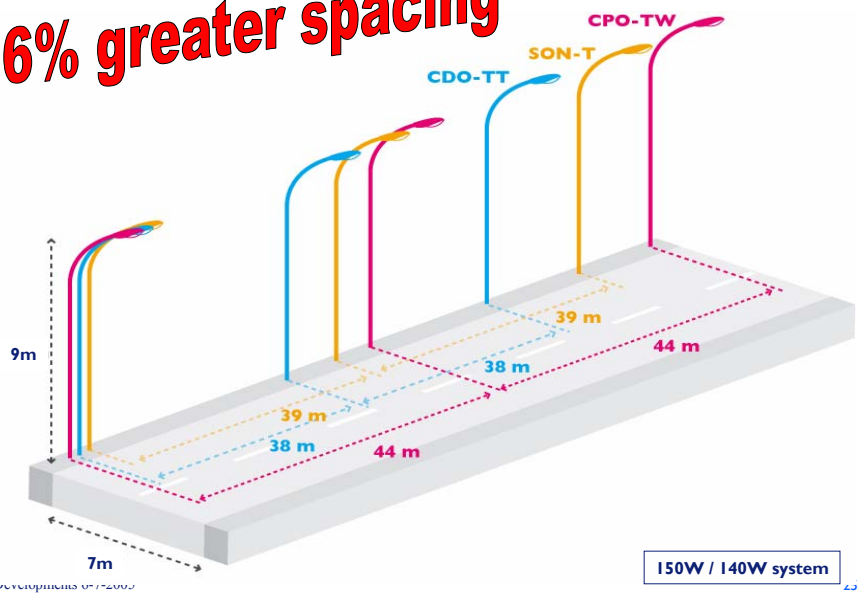
CosmoPolis On Average

Up to 16% greater spacing



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Pilot projects: Philips

Lamp: CosmoWhite 60W
Luminaire: miniMilewide, Philips Luminaires
Location: Redbridge, UK

Lamp: CosmoWhite 60W
Luminaire: miniMilewide, Philips Luminaires
Location: La Baule, France

Pilot projects: Schréder

Location: Schelde Kaaien, Antwerp, Belgium
Lamp: CosmoWhite 60W
Luminaire: Albany, Schréder

Location: Turnhout, Belgium
Lamp: CosmoWhite 60W
Luminaire: Schréder

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Example - The advantages for Redbridge in UK

25% more spacing — 24m → 30m

20% fewer luminaires — 313 → 250pcs

50% energy reduction — 118.000 → 60.000 kWh

50% CO2 reduction — 49.6 → 25.2 ton CO_2 / year

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Ecological Village Hostetin (Czech)

- **What:**

A green reference project:

- ❑Apply environmentally best indoor lighting in newly constructed training Centre for Sustainable development.
- ❑Apply environmentally best street lighting in the village

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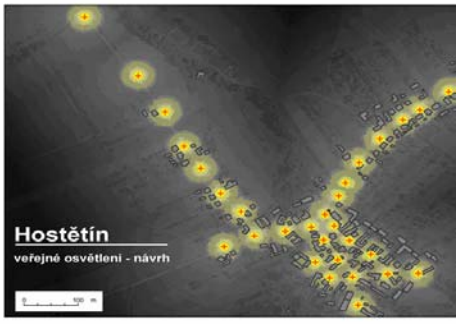


SITUATION 2005

There is 38 lightning bodies in the village, mainly situated on concrete pylons; 6 of them are non functioning. From total of 32 functioning ones 20 of them are relatively new light fittings and 12 are very old types of luminaires. Lightning is controlled by automatic timer and by twilight switch (type Schrack).

During reconstruction it would be good to optimise also location of some lights (move couple light fittings to neighbour pylons, and reduce light pollution at village square).

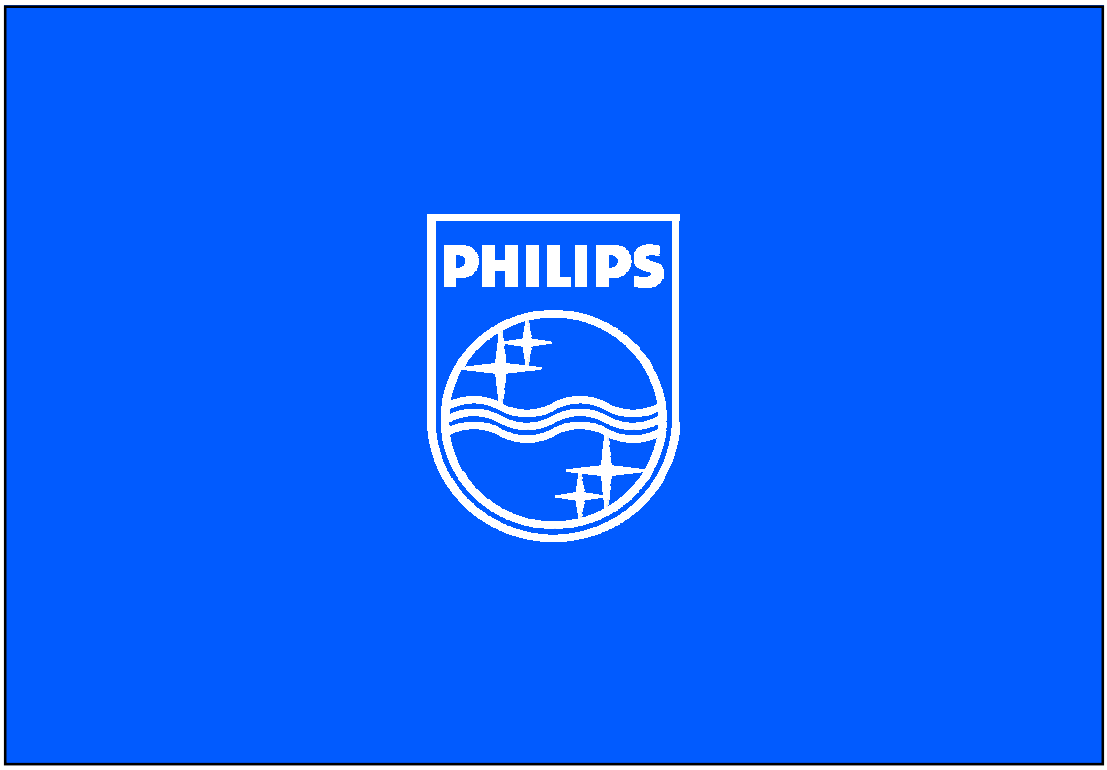
During 2004 the village used for street lightning 16 615 kWh in the Czech tariff C62 (1,29 CZK/kW), e.g. 24 000 CZK (800 EUR per year).

Types of street lights in Hostetin

Light fittings	
Newer type	20
Old type	18
Lamps	
Sodium	17
Mercury	15
Non-funcional	6
After reconstruction	
Needed No of street lamps	30
Not needed lamps	8

Cumulative and daily energy consumption

	Cumulative	Daily cons.
	kWh	*kWh/day*
25.10.2003	0	
2.2.2004	6 365	63,7
14.5.2004	4 414	43,3
22.7.2004	2 233	32,4
22.10.2004	3 603	39,2
Total	**16 615**	**45,8**



Piotr PODSIADŁO , Lamps C&EE

POLISH CONSUMER FEDERATION

Tallin 6-8 July 2005 r.

www.federacja-konsumentow.org.pl

POLISH CONSUMER FEDERATION

Independent non-government organization

Main purpose : protection of individual consumers

www.federacja-konsumentow.org.pl

Olesia FRACZEK, FK, Poland

The Federation

- was founded 7 July 1981, and has a staff of 40
- is the oldest consumer organization in eatern Europe
- is the only Polish-wide non-government organization dealing with individual consumer complaints

Educational activity in Poland involves 50 local clubs (organizational units), information, and centres on conferences, seminars, and legal advice

We have had the status of an organization for public benefit from day 1 June 2004

We are a member of Consumers International and of the European Consumer Organization, BEUC

Aim

Strengthening the Position of the Consumer in the Market

✓ System of compulsory dialogue

▪ **Free direct couselling, legal intervention and mediation and representing consumers at hearings in consumer courts, and general education of producers and consumers**

We help to solve over 250 a year thousand different kind of consumer problem

General Legal Assistance in 2004

Written submissions to commercial organisations and govt departments	8 438
Written advice	5 101
Direct advice	42 547
Telephone advice and assistance	67 830
Written complaints	695
Court actions	218
Court involvement	457
Referrals to consumer tribunal	1 311
Involvement in matters in consumer tribunal	698

SŁUŻYMY NIEODPŁATNIE RADĄ I POMOCĄ WSZYSTKIM POLSKIM KONSUMENTOM

Our Publications

All publications are free

A Strength in consumer affairs, by taking an active and visible role

Olesia FRACZEK, FK, Poland

Activities

The Federation's activties are wide-ranging

- Initiatives in legislative reform and enactments
- work on product standards and certification
- organizing and assiting in meetings and conferences
- work with Polish govenrmental and educational institutions
- research into major consumer problems
- participation as experts in trade-shows, competitions, meetings

- frequent contacts with the mass media

Historial glimpse of Consumer Protection in Poland

Publish insitutions under the old system did not show any interest at all in consumer affairs.

In the 1980s, we were the only organisation that helped consumers, and consumer rights

From the very change of the political system, the EU was a factor in the establishment of major, similar-like consumer protection, and consumer rights

Cooperation with Foreign Organizations

Your attention has been appreciated

Olesia FRACZEK, FK, Poland

WORKSHOP : Energy Efficiency potential ….

PROGRESS ON EFFICIENCY OF ELECTRICAL HOUSEHOLD WET APPLIANCES

JUNE 2005

Prepared by Joze Lah
Tallinn, Estonia, 6 – 8 July 2005

All the best …from Gorenje 54 years already!

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Slovenian and EU Household Appliances Company

Gorenje Group

www.gorenje.com

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All the best …from Gorenje 54 years already!

- **1950-1960:** Founding of Gorenje in a village with the same name, where agricultural machinery and construction material were manufactured; In 1958 the plant begins manufacturing stoves, moves to Velenje and builds own production plant;
- **1961-1970:** Diversification of activities to production of washing machines and refrigerators; In 1961 Gorenje exports 200 cookers to Germany;
- **1971-1980:** Gorenje starts acquisition of the companies with synergy to the Gorenje's core business; Beginning of own distribution network in the West with establishment of companies in Germany, Austria, France, Denmark, Australia and Italy.
- **1981-1990:** Disinvesting in non-profitable activities and focusing towards the field where Gorenje had the most experience and the best products - household appliances;
- **1991-1996:** Restructuring of business system and ownership transformation; Strong expansion onto foreign markets;
- **1997-2004:** Gorenje becomes a public company; Intensive investing into new products and technology: opening up of new markets, ecologically-sound and cutting-edge technologies, new warehousing facilities, as well as the manufacture of plastics products and packaging; Gorenje 's new product ranges are distinguished by high quality, modern design as well as consumer and environment friendly. As to its strategic plans Gorenje has infused new life into its business doctrine familiarly known as: **"Everything for Home"**.

www.gorenje.com

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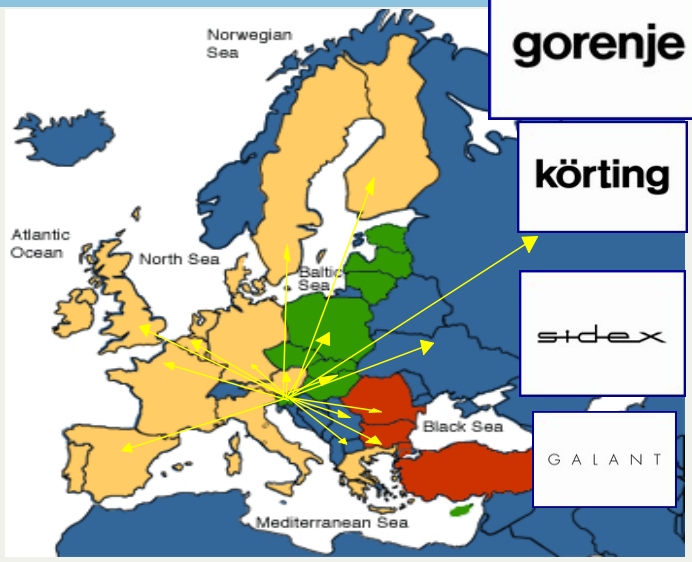
Jože LAH, Gorenjie, Slovenia

Gorenje Group Abroad

Parent Company
Gorenje. d.d.and
47 Companies:
33 abroad
15 at home
Export **93%**
European Market Share
4%
Present in **60** Countries
Sales under Own Brand
Name **75%**
3 m large Household
Appliances



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Gorenje Group divisions

NET SALES REVENUES:
Y2003: 840 m EUR
Jan-Sep04: 647 m EUR

NO. OF EMPLOYEES:
Y2003: 9,146
Jan-Sep04: 9,468

CORE BUSINESS

Y2003: 78.2%
Jan-Sep04: 79.4%

HOUSEHOLD APPLIANCES DIVISION
REFRIGERATORS&FREEZERS,
COOKERS, OVENS and HOBS,
WASHING MACHINES, DRYERS

OTHER DIVISIONS

INTERIOR FURNISHING DIVISION	**HEATING & INDUSTRIAL EQUIPMENT DIVISION**	**SERVICES DIVISION**	**ENVIRONMENT PROTECTION & ENERGY DIVISION**
Furniture Ceramics Bathrooms	Water heaters Radiators Tool&Die making	Trade engineering Car sale Catering and Tourism Immobilities	Environment Protection Energy
7.9% **7.8%**	**3.4%** **4.0%**	**9.7%** **7.6%**	**0.8%** **1.2%**

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Sales breakdown by products

Sales/ units	Cooking	%	Washing & Drying	%	Cooling	%	Total
1999	637,174	30%	507,130	24%	946,009	45%	2,090,313
2000	730,737	32%	590,883	26%	987,303	43%	2,308,923
2001	800,717	33%	595,477	24%	1,058,204	43%	2,454,398
2002	901,130	33%	661,486	24%	1,143,953	42%	2,706,569
2003	881,073	32%	682,804	25%	1,186,266	43%	2,750,143
PL2004	890,169	32%	768,509	27%	1,161,322	41%	2,820,000
Jan-Sep 2004	696,838	32%	548,765	25%	930,587	43%	2,176,190

CAGR 1999-2003: +7% per Year

77% of PL04

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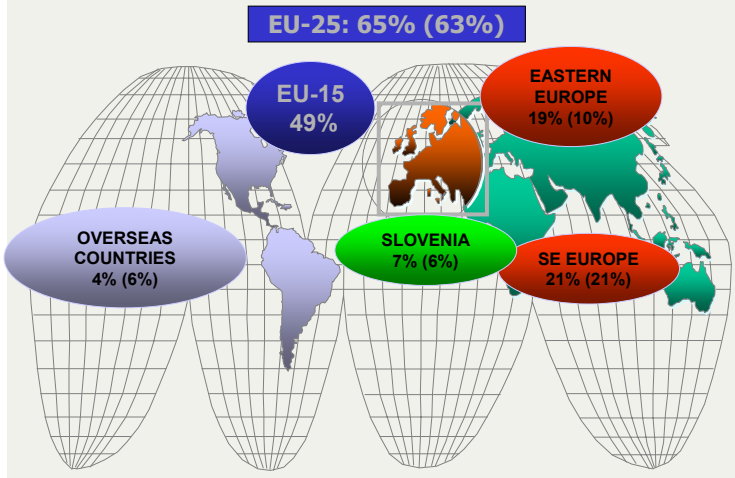
Gorenje Market Position – Sales structure (value)



Major Markets:	2003	Jan-Sept 2004
Germany:	22%	20%
Croatia:	10%	8%
Slovenia:	7%	6%
Serbia & Montenegro:	7%	7%
Denmark:	6%	6%
France:	5%	5%
Russia:	5%	5%
BiH:	4%	4%
Italy:	3%	3%
UK:	3%	4%
Bolgaria:	3%	3%
Austria:	3%	3%
Czech republic:	3%	3%
Poland:	2%	4%
USA:	2%	5%
Slovakia:	2%	1%
Other Countries:	13%	13%

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European Commission Directives

- 92/75/EEC – Indication by labeling and standard product information of the consumption of energy and other resources of household appliances

- 94/2/EC – energy labeling of refrigerators, freezers & comb.
- 2003/66/EC – adopted directive 94/2/EC (A+, A++)
- 2002/40/EC – energy labeling of household electric ovens
- 97/17/EC – energy labeling of household dishwashers
- 95/13/EC – energy labeling of household dryers
- 95/12/EC – energy labeling of household washing machines

Options for improving energy efficiency

- **Design options for COLD appliances:**

- Increase the thickness of the Door/Wall insulation
- Inclusion of VIP´s* in the Door/Wall insulation
- Increase in the evaporator heat exchange area
- Increase in the condenser heat exchange area
- Increase the efficiency of the compressor(s)
- Application of electronic controls
- Application of low – energy fans for the heat exchangers

* VIP – vacuum insulated panel

Jože LAH, Gorenjie, Slovenia

Options for improving energy efficiency

- **Design options for HOT appliances:** electric ovens

- Improve thermal insulation
- Low - emissivity oven design
- Unglazed door
- Optimize vent flow
- Optimize glazed door
- Reduce thermal mass of oven structure
- Uncover lower heating element
- Reduce auxiliary energy
- Forced convection

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Options for improving energy efficiency

- **Design options for HOT appliances:** gas ovens

- Improve thermal insulation
- Forced convection
- Unglazed door
- Reduce thermal mass of oven structure
- Preheat combustion air
- Optimize glazed door design
- Passive cooling for door surface
- Reduce excess air
- Reduce auxiliary energy

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Options for improving energy efficiency

- **Design options for WET appliances:** dryers

- Reduce temperature of drying
- Optimize heating element – single/double
- Reduce thermal mass of structure
- Optimize ventilator design
- Optimize air flow design
- Reduce waste air
- Application of electronic controls
- Implement heating pump

Options for improving energy efficiency

- **Design options for WET appliances:** **washers**

- Reduce temperature of washing
- Reduce quantity of water during wash cycle
- Reduce thermal mass of structure
- Optimize the time of wash cycle
- Optimize the power of motor in action
- Implement asynhron motor with phase regulation
- Application of electronic controls
- Optimize agitation phase in wash cycle

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Trends in washing machines and dryers industry

- market want energy saving washing machines and dryers
- special programmes are advantage: mix programme, jogging, quick, intensive, special programme for kids laundry and toys, gentle programme for wool, etc.
- sophisticated design, more circulated shapes and materials such as stainless still, aluminum with black or colorful endings
- big door opening
- intelligent solutions, where people only set the type of laundry, dirtiness and machine by itself determinate the settings and do the washing; machine also takes care of optimal water and energy consumption during the cycle
- frontloaders are still the most interesting

Source: Euromonitor

Impact to the energy consumption on consumers side

- WASHING AT LOW TEMPERATURE:

consumption at	40°C	60°C	90°C
kWh/kg	0,096	0,170	0,341

- FOOL LOAD WASHING
- SELECTION OF OPTIMAL WASH PROGRAM

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OFFERED FEATURES

INTELLIGENT SOLUTIONS are here to ensure the best way to wash your clothes.

EASY TO USE SOLUTIONS help doing your laundry faster and especially easier than ever.

SAFETY AND ENVIRONMENT SOLUTIONS help you to be us much friendly to nature and at the same time protecting your clothes and your whole family.

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INTELLIGENT solutions

UseLogic®

Intelligent sensors and other smart features constantly gathers information about the washing progress, making adjustements to ensure the best possible washing result with a minimum of water, energy and detergent consumption.

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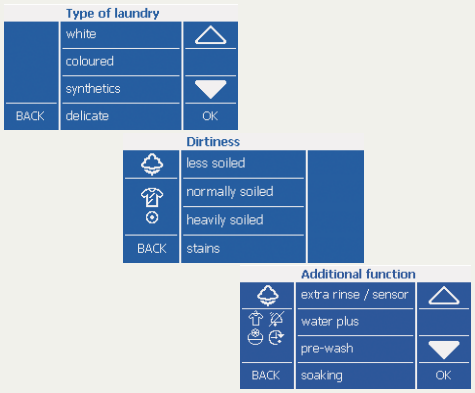
EASY TO USE solutions

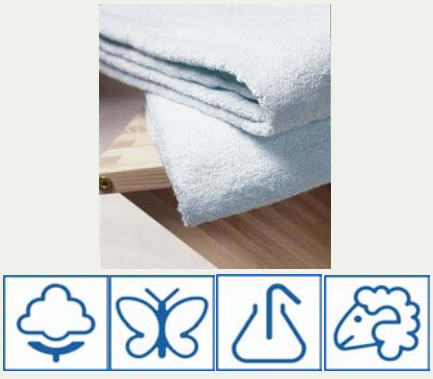
Wash Wizzard



- UNIQUE washing programme
- select the type of textile (cotton, synthethics, sensitive, wool,...)
- select the grade of dirtiness (light soil, special staines...)
- choose additional functions (Start delay,…)
- press Start and the washing machine will do its work

EASY TO USE solutions

Pre-settled programmes



- already pre-settled programmes for:
  - cotton
  - delicate
  - synthetics and
  - wool

in all washing machines models

EASY TO USE solutions

Special programme
MIX

You can wash up to 6 kg of various textiles of similar colour at up to 30° C instead to sort your clothes first and wash them seperately.

You can dry up to 6 kg of various textiles together.

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EASY TO USE solutions

Special programme
JOGGING

A programme for quick washing of smaller quantities of less-soiled laundry such as sportswear after jogging, running, aerobics, etc.

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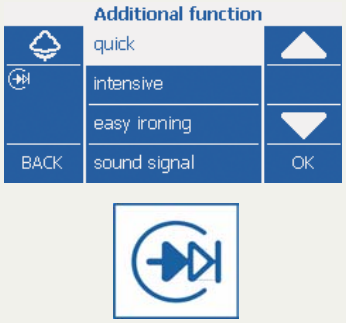
EASY TO USE solutions

Special programe/function
QUICK



For less-soiled laundry, you get a shorter washing cycle with fewer rinses.

The fastest QUICK wash program takes only 25 minutes.

You can also dry your laundry with quick program and shorten your drying time.

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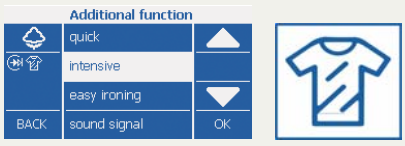
EASY TO USE solutions

Special programe/function
INTENSIVE



An intensive, additional treatment for up to 6 kg of heavily soiled, non-delicate textiles at temperature up to 60° C.

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EASY TO USE solutions

Special program/function
EASY IRONING

With more water and lower spin speed for intermediate and final spinning, this program keeps the creases out of your clothes and making them easy to iron.

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EASY TO USE solutions

Special function
HALF LOAD

- if you don"t have enough laundry to wash you can choose "half load" function
- choosing this function you save water and energy
- optional function

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EASY TO USE solutions

Communication in local language

- models equipped with display enable you to choose the language you prefer
- you can communicate with your washing machine/dryer in your own language

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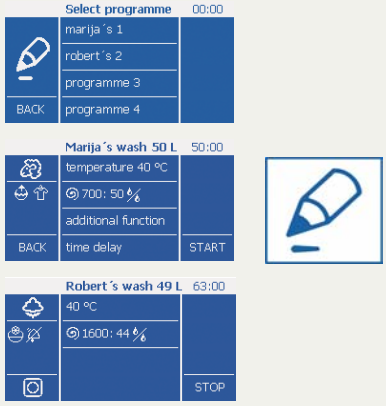
EASY TO USE solutions

Personal settings – making your own programmes



- some of the models allow you to create and store your own special programmes (set the temperature, spin speed, type of textile, etc.)
- useful, when you often repeat the same washing procedure
- when the programme is once stored you just select it and press Start

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SAFETY & ENVIRONMENT solutions

ECO system

- it prevents detergent from draining out during water intake
- the detergent stays in the drum the entire wash cycle
- giving you 100 % utilisation
- with it, you take care of the environment
- up to 20% savings on detergent costs

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SAFETY & ENVIRONMENT solutions

4D moistening system

4D

- it quickly brings water and detergent into concat with laundry
- soaking from bottom, from top (shower system) and from side of the drum (injection)
- fast and better moistening of your clothes and improved washing result

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SAFETY & ENVIRONMENT solutions

SCS –
Stability Control System

- it assures completely stagnant washing machine during the spin cycle
- electronically guided system takes care of appropriate laundry distribution and automaticlly adjusts spin to the quantity and dispersal of laundry
- one of the results of the system is also silence of washing machines

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SAFETY & ENVIRONMENT solutions

PMP – Programme
Misapplication
Protection

- safety system protecting your clothes
- it simply won"t allow you to set the wrong temperature or spin speed for your selected programme in washing (pre-setted programmes and special programmes)

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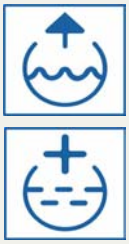
SAFETY & ENVIRONMENT solutions

Extra water for Alergics



For sensitive people or those who are allergic to detergents

You have two options:

- you can set "extra water" during the process or
- set additional rinses

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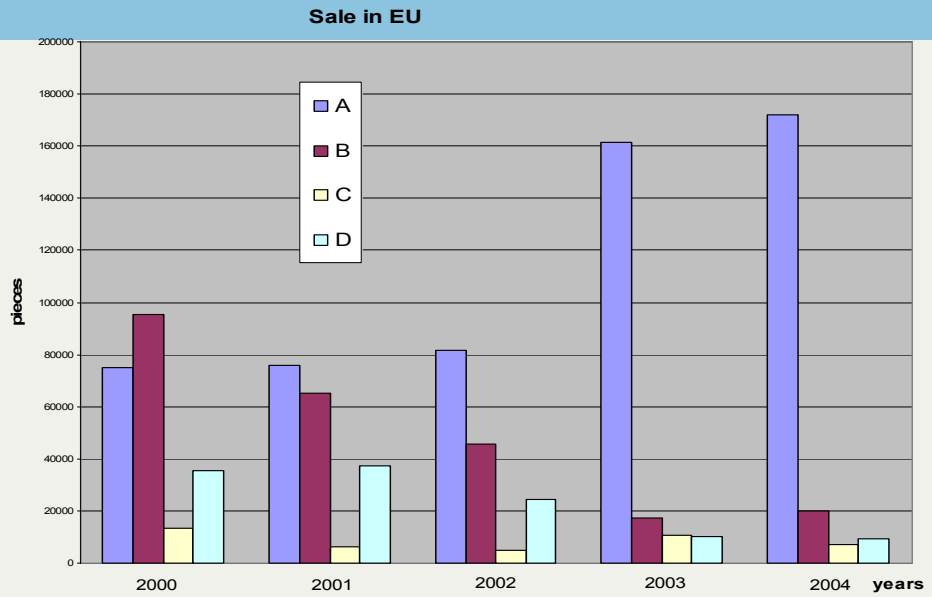
RESULTS IN LAST FIVE YEARS



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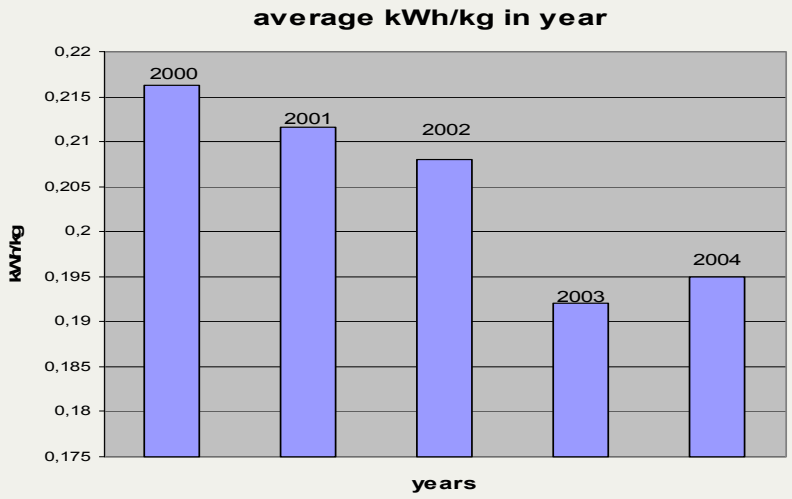
RESULTS IN LAST FIVE YEARS



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CONCLUSIONS

- The impact to reducing the consumption of energy are on side of consumers and producers of appliances.
- Secondary impact is on side producers of detergents and clothes.

Final statements:

- Increasing quality of detergent allows us low temperature washing,
- Consumers saving behavior,
- Sophisticated appliances with technology UseLogic®

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SESSION 2:

ELECTRICITY END-USE IN RESIDENTIAL AND TERTIARY – STATUS AND TRENDS

The Central and Eastern European Countries Appliance Policy project

CEECAP Overview

The Project

- Facilitates and stimulates the implementation of appliance energy efficiency policy in Central and Eastern European Countries
- Based on country reports and national participation
- Transfers knowledge and experiences from West to Central to Eastern Europe and within regions

Frank KLINCKENBERG, Klinckenberg Consultants, The Netherlands

Main Points

The issues…

- CEEC – EU market & policy convergence
- Acquis Communautaire implementation in CEEC
- Participation in European policy design process

…and actions

- Identify and analyse common topics
- Develop joint approaches
- Provide guidelines and expert advice

The rationale for adopting EU S&L

- Accession obligation
- Leads to proven national energy savings; thus reduced energy imports
- Reduces household energy bills, in times of rising electricity prices
- Stimulates convergence of national markets with EU
- Stimulates efficiency during rapid market development

Frank KLINCKENBERG, Klinckenberg Consultants, The Netherlands

Impact of EU Standards and Labels – UK case

- UK market:
  - Large share of (relatively) low cost products
  - Traditionally behind neighbouring countries in appliance energy efficiency
  - Relatively little action promoting S&L until late 1990s
  - Start of Market Transformation Programme 1998
  - Followed up by Energy Saving Trust programme
- A model for many Central European countries?

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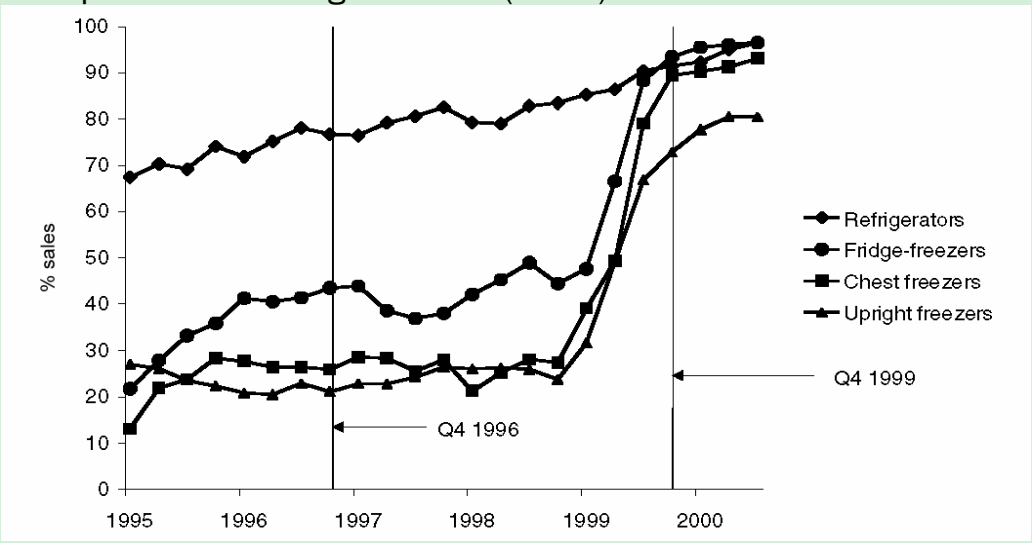
Development of EE in the UK, 1995 - 2000

Cold products meeting EU MEPS (1999) level:



Source: Schiellerup, 2001, An examination of the effectiveness of the EU minimum standard on cold appliances: the British case, in: ECEEE 2001 proceedings

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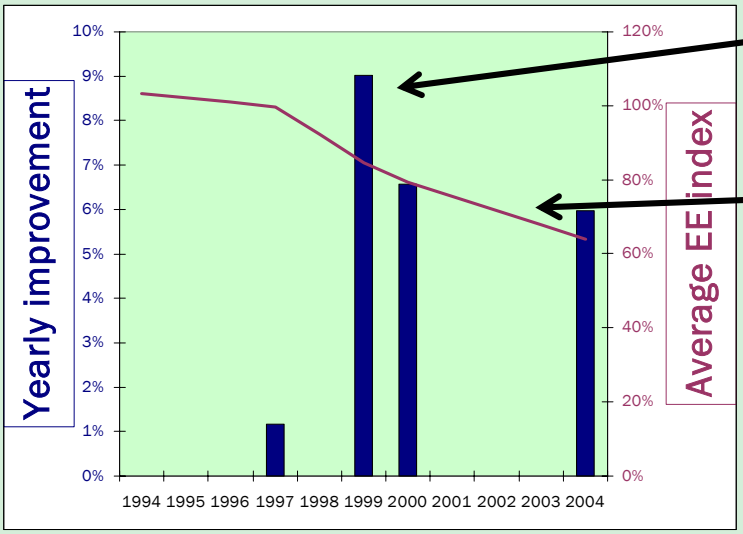
Development of EE in the UK, continued

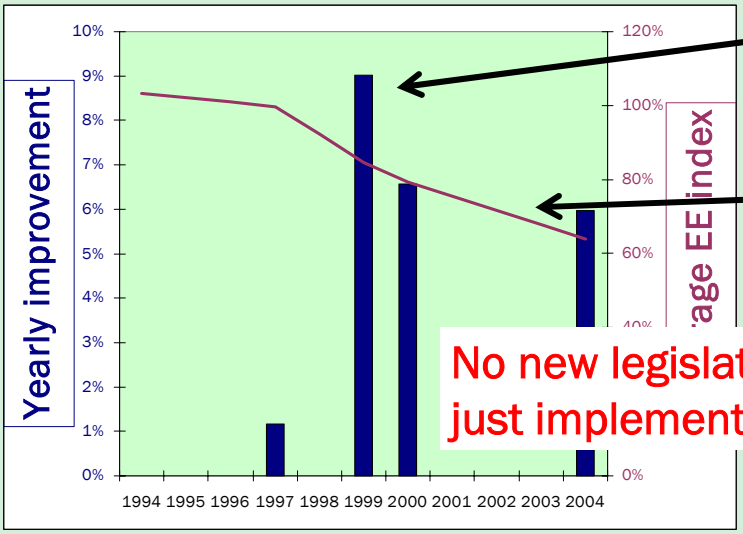


EU MEPS implemented

Continued development

Source: compilation of Schiellerup (2001) and GfK (2004)

Development of EE in the UK, continued



EU MEPS implemented

Continued development

No new legislation, just implementation!

Source: compilation of Schiellerup (2001) and GfK (2004)

Frank KLINCKENBERG, Klinckenberg Consultants, The Netherlands

Possible impact in Central European countries

- Calculated impact of EU S&L implementation Bulgaria, Romania, Croatia:

	2010	2020	2030	2010	2020	2030
	GWh			kT(CO2)		
Refrigerator-Freezers	186	2813	5016	72	1088	1941
Stand-Alone Freezers	60	903	1610	23	350	625
Washing Machines	76	638	912	30	248	355
Total	322	4354	7538	125	1687	2920

NB: impact continues long after end of project, due to market transformation effects

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Project impact in 7 Central European countries

Country	2002 total final residential electricity consumption (GWh)*	Potential Electricity savings (GWh)	
		Yearly savings by efficient appliances	Cumulative savings reached by project achievements
Czech Republic	14121	70.5	705
Bulgaria	9306	46.5	465
Hungary	10440	52.2	522
Poland	21659	108.3	1083
Slovakia	4907	24.5	245
Lithuania	1811	9.6	96
Romania	7771	38.9	389
Total:		approx 350 GWh/year	approx 3505 GWh cumulative

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Steps in the implementation of S&L

1. Deciding products, priorities, timing *(EU)*
2. Developing testing capabilities *(Nat)*
3. Designing and implementing labelling programme *(Nat / EU)*
4. Analysing and setting standards *(EU)*
5. Involving all stakeholders *(Nat / EU)*
6. Maintaining and enforcing compliance *(Nat)*
7. Evaluating the programme *(Nat / EU)*

EU: primarily European responsibility

Nat: primarily National responsibility

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Status Quo in the implementation of S&L

1. Deciding products, priorities, timing *(EU)*
   Participation in policy development needs to be developed
2. Developing testing capabilities *(Nat)*
   Procedures & experience with EU practice needed
3. Designing and implementing labelling programme *(Nat / EU)*
   Much more attention needed, especially in involving parties
4. Analysing and setting standards *(EU)*
   Participation in policy development needs to be developed
5. Involving all stakeholders *(Nat / EU)*
   Accommodation and encouragement of stakeholders needed
6. Maintaining and enforcing compliance *(Nat)*
   V&E programmes need to be developed and initiated
7. Evaluating the programme *(Nat / EU)*
   None existent

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Current activities

- CEECAP Guidelines finalised: to assist national experts in the implementation process
- UNDP / GEF project prepared, managed by UNDP Bulgaria, covering: Bulgaria (EnEffect), Romania (UNDP & ARCE), Croatia (Energy Institute Hrvoje Pozar), possibly Turkey
- CEECAP EIE project prepared

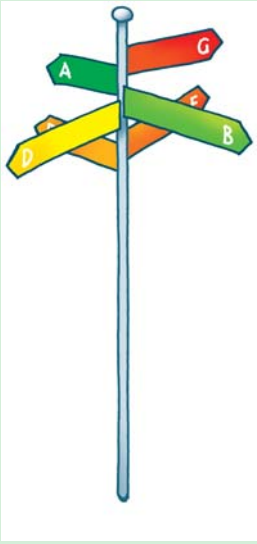
Central and Eastern European Countries Appliance Policy project *Klinckenberg Consultants*

CEECAP EIE project partners

SEVEn (project manager)	Czech Republic
ADEME	France
Austrian Energy Agency	Austria
ARCE	Romania
Central European University	Hungary
EnEffect	Bulgaria
KAPE	Poland
Lithuanian Energy Institute	Lithuania
Slovak Energy Agency	Slovak Republic
Klinckenberg Consultants	The Netherlands
Supported by: IEA, UNDP, SenterNovem, CECED Czech Republic, CECED Slovak Republic	

Central and Eastern European Countries Appliance Policy project *Klinckenberg Consultants*

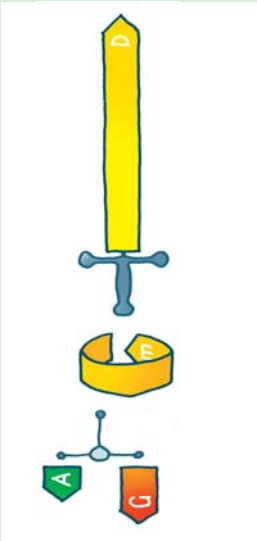
Overview Policy Design guideline



- EU Policy design process
- Current EU appliance energy efficiency Acquis & Negotiated Agreements
- Formal and informal interaction points
- Checklist: How to interact with the EU policy design process
- Directory of key parties
- Examples of successful national policies (UK, D, CZ, NL)

Central and Eastern European Countries Appliance Policy project *Klinckenberg Consultants*

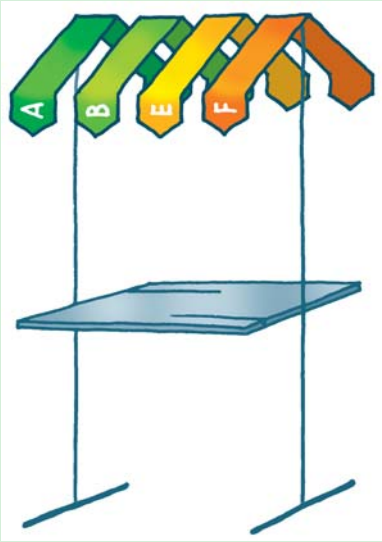
Overview Verification & Enforcement guideline



- Requirements for verification & enforcement infrastructure
- Step-by-step approach
- Preparation of legal framework
- Verification checklists
- Enforcement actions
- Best practise: Verification test procedure

Central and Eastern European Countries Appliance Policy project *Klinckenberg Consultants*

Overview Market Introduction guideline



- Status quo overview
- Step-by-step planning model for market introduction
- Checklist: critical points (do's and don'ts)
- Data collection requirements & tips
- Cost-effectiveness assessment
- Best practices CD-ROM

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Suggestions for future expansion

- Extend implementation work to more CEE and South-Eastern Europe countries
- Extend scope to EU buildings energy efficiency policy
- Explore application of CEECAP-principles to other geographical areas (partially) adopting EU energy efficiency policies (CIS, Turkey, Middle-East, Northern Africa).

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To Be Continued.....

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CEECAP Verification & Enforcement Guideline: Impression 2: shop visit checklist

Table 3. Items for a shop visit checklist

Checklist item	Comments
Shop (visit) specific items: • name of the shop • address, etc. • date and time of visit • name of person that carried out the visit	This data is – a located and id enforcement if
Appliance specific items: • definition of the appliance (see directives and EN test standards) • the appliance should be displayed for sale; appliances for repair, second hand appliances and appliances not for sale, e.g. in storage, need not be labelled.	Knowing whic Several implen from labelling, labelling unde included in the
Label specific items: • the *layout* of the label, e.g. does the label contain the coloured bars (a black & white copy is not allowed, except for lamps) • does the label indicate the *correct type of appliance*, e.g. is not a dishwasher label displayed on a washing machine	The label is de practice the la and a data stri handling: only with the appli bars, which is

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CEECAP Verification & Enforcement Guideline Impression 1: step-by-step approach

Legal obligation	Practical steps
Preparation of legal framework	
Member States shall adopt the provisions necessary to comply with this Directive (art 14(1))	• Introduction of legal framework for appliance energy efficiency policy → Step 1 • Transposition of (implementing) directive under national legal framework → Step 2 • Assign responsibilities to appropriate services and/or agencies → Step 3
Verification	
Verification of ***dealers*** obligations:	• Shop inspections to answer the

Central and Eastern European Countries Appliance Policy project — *Klinckenberg Consultants*

CEECAP Verification & Enforcement Guideline: Impression 3: Position of the label checklist

Appliance	Position
General	The label shall be attached in the clear relevant directive.
Refrigerators, freezers and their combinations Washing machines Tumble driers Combined washer-driers Dishwashers Air conditioners	The label shall be placed on the outside of the front or the top of t in such a way as to be clearly visible, a
Lamps	The label shall be placed or printed on, individual packaging of the lamp. Noth attached to, the individual packaging reduce its visibility
Ovens	The label shall be placed on the door o to be clearly visible and not obscured. I cavity shall have its own label, except within the scope of the harmonized stan

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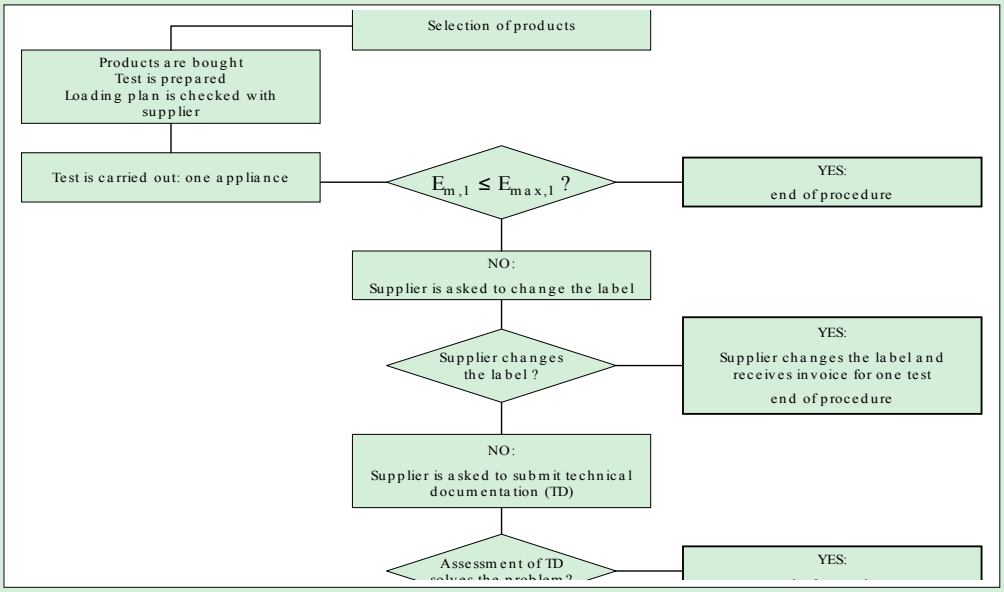
CEECAP Verification & Enforcement Guideline: Impression 4: Verification test procedure



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End-use efficiency in buildings and Energy Policy in Czech Republic

Josef Bubeník
Director
Czech Energy Agency

EE – Tallinn
ESTONIA
6 - 8 July 2005

Country Report
Czech Republic

Current situation in housing

Number of dwellings	Total number of dwellings	Dwellings unfit for occupancy	Available housing stock*
1991 Public Census	4,077,193	37,455	4,039,738
2001 Public Census	4,366,293	53,861	4,312,432
Increase in %	7.1	43.8	6.7

Dwellings per 1,000 inhabitants	Total number of dwellings	Available housing stock*
1991 Public Census	396	392
2001 Public Census	427	421

Country Report
Czech Republic

Current situation in housing

- According to the 1991 Public Census, the **total housing stock** comprised of 4,077,193 dwellings, 0.9% of which (37,455) were unsuitable for occupancy.
- Results of the 2001 Public Census suggest that the housing stock presently consists of 4,366 293 dwellings of which about 1.4% are unfit for habitation (approx. 55 thousand dwellings). In the past ten years, the size of the housing stock has therefore increased by approximately 7.2%.
- The **size of the housing stock per capita** expressed by number of dwellings per 1,000 inhabitants is better than at the beginning of the 1990s. While there were 396 dwellings per 1,000 inhabitants in 1991, this number grew to 427 by 2001.
- According to partial results of the 2001 Public Census, there are 1,969 568 buildings.. About 43% of dwellings are situated in family homes, others, save for some exceptions, are located in apartment buildings.
- The size of dwellings improved during the 1990s. In 1991, average **living area** of a permanently occupied dwelling was 45.9 square meters, in 1999 was to 53.7 square meters.

Country Report
Czech Republic

Current situation in housing

Sectors	Share in%
Privately-owned housing	47%
Municipal rental housing	23%
Private rental housing	7%
Cooperative rental housing	17%
Other	6%
Total	100%

Country Report
Czech Republic

Current situation in housing

Time of construction	Share in %	Number of dwellings x 1000
Until 1919	10.90%	4762
1920 – 1945	14.70%	6423
1946 – 1970	26.30%	11491
1971 – 1980	22.50%	9831
1981 – 1990	16.40%	7166
1991 – 2001	8.20%	3583
Unknown	1.0%	437

Country Report
Czech Republic

Construction of housing 1991-2001

Materials	Blocks of flats	Family houses	Others	Total
Baked matter bricks, profilated bricks	53.1%	62.7%	48.1%	61.3%
Stones, baked matter bricks	11.3%	28.7%	37.0%	26.7%
Concrete panels	33.5%	0.9%	7.4%	4.9%
Other materials	2.1%	7.7%	7.4%	7.1%
Total	100.0%	100.0%	100.0%	100.0%

Country Report
Czech Republic

Construction of housing 1991-2001

Dwellings in:	Dwellings number	Dwellings structure
Family houses	10 466	42%
Residential buildings	5 926	24%
Superstructures, built-in structure and additional buildings	5 250	21%
Social care houses	687	3%
Non-dwelling buildings		3%
Non-dwelling areas	2 133	8%
Total	**25 207**	100%

Country Report
Czech Republic

Current situation in building standards

- **CSN 73 0540 -** Thermal protection of buildings (1994)
- The standard **CSN 73 0540** was recommended in **the 2 sets mandatory** in the year 2002 (December) – updated in January 2005. The U_N-value was recommended for building designed inner temperature 20 °C.
- **CSN EN ISO 10 211 – 1; CSN 73 0551 (October 1997)**
- Thermal bridges in building constructions – heat flows and surface temperatures
- **CSN EN 13 789: CSN EN ISO 6946; CSN 73 0558 (July 1998)**
- Building components and building elements – Thermal resistance and thermal transmittance , Calculation method
- Thermal insulation, buildings, components, building elements, thermal properties, heat transfer, determination, thermal transmittance, rules of calculation

Country Report
Czech Republic

Barriers to low energy and low cost social housing

- Legal barriers
- Institutional barriers
- Technical barriers
- Fiscal/Financing barriers
- Other barriers

Legal barriers

- The clear definition of low energy housing and its implementation in the legal/standardisation system is still missing.
- Due to that low energy housing is not mandatory even if construction is done using public financing.

Josef BUBENIK, Czech Energy Agency, Czech Republic

Institutional barriers

- No special programme for promotion of low energy low cost (social) housing in the Czech Republic.
- The housing policy proposal of 2001 does not deal with low costs social housing.
- The demonstration programme operated by the Czech Energy Agency in 1998-2001 was terminated despite the fact that it was successful. Neither the Ministry for Regional Development nor the State Housing Fund are able to prolong the existence of programme.
- Currently there is no institution dealing with low energy social housing despite the fact that there are various groups of experts who are involved mostly in practical design of low energy housing, their activities are not co-ordinated.
- Low energy housing is not sufficiently promoted as a part of professional training of architects and civil engineers both in gradual and post gradual training except few individuals. Low energy housing would become a regular part of the training.

Technical barriers

Despite the fact that that materials and technologies needed for low energy house construction are available on the market, there are still some technical barriers:

- The regional planning still does not take into account low energy housing concept when designing the infrastructure. Due to that some advantages of low energy housing can be lost (e.g. utilisation of passive solar heating cannot be fully utilised if the roads are not properly located).
- Some construction companies are still not able to meet necessary requirements in quality of construction and thus to reach parameters for low energy housing in practice.

Josef BUBENIK, Czech Energy Agency, Czech Republic

Fiscal barriers

- Despite the fact that a system of tax exemptions exists in the Czech Republic there are some difficulties with their application.
- Calculation of tax exemptions and their effectiveness is very problematic. Tax exemptions that take into account housing-related problems have been introduced into the Czech taxation system mainly due to the transformation of the economy (privatisation, restitution) and establishment of a new system of financing housing (construction savings plans, mortgages).
- Important relief is provided by the possibility of deducting paid interest on housing-related loans from the income tax base and exempting newly constructed buildings from the property tax for 15 years.
- Exempting sale of real estate used for residential purposes, including transfers of membership rights and compensation for vacating a dwelling, from the income tax facilitate financing of people's housing needs.

Country Report
Czech Republic

Financing barriers

- The budget available is limited
- The solutions implemented are not least cost solutions but low cost/quality solutions

Country Report
Czech Republic

Incentives for low energy and low cost social housing

- Legislation
  - Low energy and low cost social housing does not exist in the legislature
  - Government Decree 146/2003
    - The tenants are selected according to criteria of income to get the rental housing. Such housing is financed according to the Government Decree 146/2003 Call. on financing of housing of special income groups of population.
    - The criteria are as follows: 80% of annual average income in the CR for last 12 months for a single person, 150% of annual average income in the CR for last 12 months for family.

Incentives for low energy and low cost social housing

- Grant financing
  - Czech Energy Agency
    - special programme for grant co-financing of low energy housing
    - limited time of validity in 1998-2000
    - flexible criteria for selection of projects
    - total volume of grants: 300 MEuro
  - Ministry for Regional Development
    - new programme since 2002
    - grants for rehabilitation of current and construction of new social housing
    - budget very limited, covers up to about 50% of investment costs for social housing

Josef BUBENIK, Czech Energy Agency, Czech Republic

Criteria for project selection - CEA programme

	Criteria CEA for Low energy single house	
1997	Consumption of energy for heating and Domestic Hot Water - less than **5,5 MWh/200m^3.rok**	200 m^3 is specific flat of the clear height of the flat 260 cm is critérium = **74 kWh/m^2.y** including energy for DHW
1998	Consumption of energy for heating - less than **5,5 MWh/200m^3.rok**	200 m3 is specific flat of the clear height of the flat 260 cm is criteria = **74 kWh/m^2.y**
1999	Consumption of energy for heating - less than **5,0 MWh/200m^3.rok**	200 m3 is specific flat of the clear height of the flat 260 cm is criteria = **67 kWh/m^2.y**
2000	$q_c \leq q_{c,N}$ desired	= **58 - 131 kWh/m^2.rok** (commensurate with geometrical characteristic of the building An/Vn)
2001	$q_{red} \leq q_{red,N}$ desired	= **35 - 106 kWh/m^2.rok** (commensurate with geometrical characteristic of the building An/Vn)

Country Report
Czech Republic

Review of selected projects rewarded by grant by CEA

	Numer of applications (applied projects)	Sustainable applications	Numer of promoted projects	Closed projects estate to September 2001	Totally promoted sum	Part of promoted sum from CEA in the year
1998	70	50	24	7	5,158 mil. Kc	1,5 %
1999	39	35	13	5	2,375 mil. Kc	0,8 %
2000	3	3	3	1	0,660 mil. Kc	0,3 %
2001	10	2	0		0	0
total	122	90	40		8,192 mil. Kc	

Country Report
Czech Republic

Definition of low energy housing designs

- Low energy block of flats:
  - 55 kWh/m2 (space heating), 85 kWh/m2 (total)
- Low energy family house:
  - 70 kWh/m2 (space heating), 100 kWh/m2 (total)

Country Report
Czech Republic

Financing of RUE in housing

- Some banks offer special financial packages for financing RUE in housing sector in compliance with the Government Decree No. 299/2001 Call. On use of financial sources of the State Housing Fund for covering a part of interest rate on loans provided by commercial banks to physical and juridical bodies for rehabilitation of the housing stock and refurbishment of concrete panel houses.
- The Czech Saving bank offers for its clients a parcel of services for implementation of the government programme which includes analysis of the housing stock, development of various variants of financing necessary for making decision by municipalities, providing loan with preferential interest rates, development of necessary design and drawings, preparation of documents for construction permission, application to the and also project management of the preparation and implementation of the RUE project including insurance of the housing, help in calculation of the monthly rent.

Country Report
Czech Republic

Financing of RUE in housing

- The **Czech Saving bank** offers for its clients a parcel of services for implementation of the government programme which includes:
  - analysis of the housing stock,
  - development of various variants of financing necessary for making decision by municipalities,
  - providing loan with preferential interest rates,
  - development of necessary design and drawings,
  - preparation of documents for construction permission,
  - application to the and also project management of the preparation
  - and implementation of the RUE project including insurance of the housing, help in calculation of the monthly rent.

Country Report
Czech Republic

Examples of low energy and low cost housing designs

- Block of flats Humpolec - Mr. Ryzner
  - 40 kWh/m^2
- Block of flats in Zelezny Brod - Mr. Cizek
  - consumption 55 kWh/m^2
- Terrace house in Uherske Hradiste - Mr. Ruzicka, Novak
  - consumption 47 kWh/m^2
- Terrace house in Uhersky Brod - Mr. Horny, Brotanek, Zdara, Moravek, coll.
  - Consumption 10 kWh/m^2
- Single house in Prosec - Mr. Horny, Zdara
  - consumption 18 kWh/m^2

Country Report
Czech Republic

Examples of implemented low cost low energy housing projects

- Block of flats in Susice - Mr. Vanecek, Zdara
  – consumption 45 kWh/m^2
- Low energy houses in Svitavy - cooperation with PRC Bouwcentrum and Mecaroo Architect from Delf
  – including of this project are 20 houses
  – realized were: 4 double houses and 2 single houses

Country Report
Czech Republic

Example of implemented low energy and low energy multifamily housing project - Sušice

- 9 residential units
- Investment costs fully comparable with regular housing construction
- Energy intensity reduced by 40-50% and it is expected to be 49 kWh/m2 of heated living area.
- Total energy consumption for space heating 30,278 kWh/year - arranged though central hot water system with gas boiler with output of 20 kW.
- Air ventilation is arranged through forced air ventilation system with waste heat regeneration.

Country Report
Czech Republic

Example of implemented low cost low energy housing projects

- Low energy houses in Svitavy - cooperation with PRC Bouwcentrum and Mecaroo Architect from Delf
  - including of this project are 20 houses
  - realized were: 4 double houses and 2 single houses
  - Specific energy consumption for space heating is 79.3 kWh/m2/year, specific energy consumption for tap water heating is 13.7 kWh/m2/year and total specific energy consumption for space and water heating is 93.0 kWh/m2/year.
  - Specific costs per square meter of heated area are 22,500 CZK.

Country Report
Czech Republic

Conclusions

Aim of low energy and low cost social housing

- Meet housing needs of vulnerable part of population at reasonable quality and costs;
- Reduce the burden on public budgets (both government and municipal) through reduction of both housing costs and living costs;
- Promote new technologies, utilisation of RES and RUE in housing policy; and
- Reduce emissions of pollutants and greenhouse gases.

Country Report
Czech Republic

Conclusions

Definition

- In the Czech Republic no official definition for both low energy housing and social housing exists. Thus, there is also no official definition of low energy social housing. Thus, within the current project we set the definitions presented below.

Quality of social housing

- Every building including social housing must meet requirements of building regulation (Building Code) as regards the quality of housing.

Conclusions

Energy consumption

- Annual energy consumption for space heating per unit of heated useful floor area depending on type of housing and taking into account an average climate in the Czech Republic would not be higher than the following figures:
  - Low energy block of flats: 55 kWh/m2
  - Low energy family house: 70 kWh/m2.
- In addition to energy consumption for space heating there is also consumption for tap water heating and for electrical appliances. In case of Low energy block of flats total energy consumption is assumed to be 85 kWh/m2 and in case of low energy family house the total energy consumption is assumed to be 100 kWh/m2.
- In addition, there are passive houses with energy consumption up to 15 kWh/m2 but they are not taken into account in this study.

Conclusions

Type of low energy and low cost social housing

- ***Rehabilitation of current social housing***
- We can assume that block of flats built using prefabricated concrete panels in EU accession countries in 1960s and 1970s can be included in the category of social housing due to their low quality and the way the flats were rented to tenants based on the criteria of social aid. Most of such type of housing required urgent rehabilitation. Experiences show that such housing can be converted to low energy and low cost social housing using much lower costs than in case of building new housing.
- ***Construction of new social housing***
- Primarily social housing is assumed in block of flats in which flats would be rented to tenants from the groups listed above. But in rural areas also family houses can be assumed to be social housing.

Country Report
Czech Republic

Conclusions

Costs of low energy and low costs social housing

- The combination of low cost housing and low energy housing is sometime crucial to reach with social housing. To make this type of housing acceptable for target groups of population the maximal costs were set as follows:
  - 20,000 CZK/m2 in block of flats (650 Euro/m2)
  - 25,000 CZK/m2 in single family houses (800 Euro/m2).
- These costs do not include costs for building necessary infrastructure (roads, energy connection network, drinking water supply network, sewerage, etc.).
- Government grant available for social housing (about 50% of costs):
  - 550,000 CZK per dwelling (17,000 Euro)
  - 650,000 CZK per dwelling (including local roads) (20,000 Euro)

Country Report
Czech Republic

- The first part was pepared with consulting office ENVIROS and Mr Ivan Vanický

Country Report
Czech Republic

Energy policy
Philosophy update

ČEA

PRIORITIES → definition

OBJECTIVES

4 main, 15 partial objectives (incl. indicative targets)
- present state
- instruments already applied
- required targets
- new instruments

INSTRUMENTS → legislation, programmes, policy outlooks

energy sector development scenario
primary sources proportion until 2030

Country Report
Czech Republic

Energy policy
Priorities

- **INDEPENDENCE**

  foreign primary sources
  sources from risky areas
  security of supply

  → domestic coal preference
  → oil and gas
  → nuclear power

- **SECURITY OF SUPPLY**
- **SUSTAINABLE DEVELOPMENT**

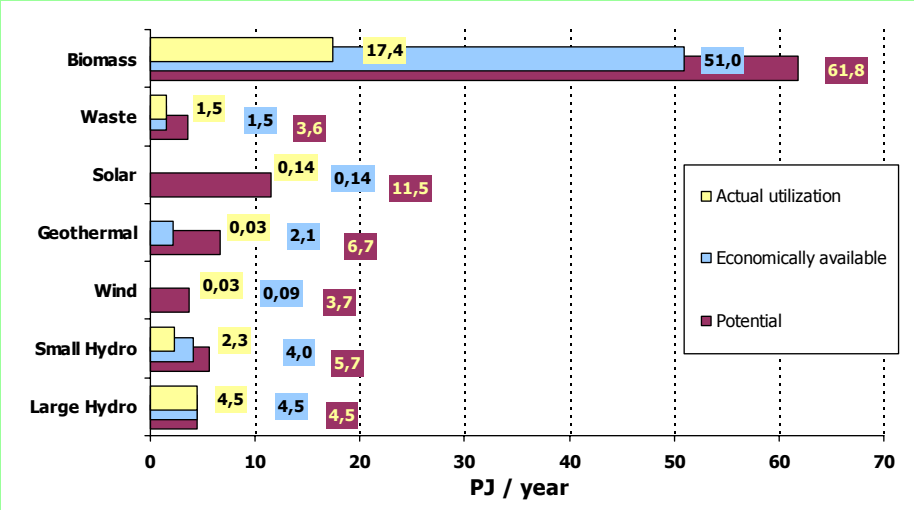
Country Report
Czech Republic

Energy policy
Objectives

- **ENERGY EFFICIENCY**
  - new power sources with higher efficiency
  - process efficiency - energy intensity of GDP creation
  - heat savings
  - appliances efficiency
- **SUITABLE PRIMARY SOURCES PROPORTION**
  - domestic sources – brown, bitumous coal
  - renewables – biomass, wind (from 3% to 8% in 2010)
  - nuclear power – new units after 2025
- **ENVIRONMENTAL PROTECTION**
  - further reduction of emissions production
  - reduction of greenhouse gases emissions
  - minimisation of waste influence – recycling, disposal

Country Report
Czech Republic

Renewables
Potential in Czech Rep.



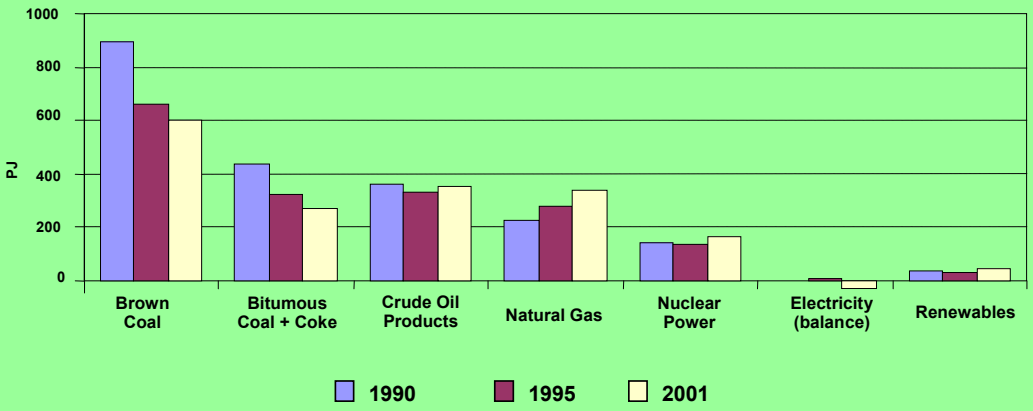
Country Report
Czech Republic

Renewable electricity
Promotion today

- **ENERGY ACT (from 2000)**
  - preferential connection to grid
  - buyout obligation for distribution company
  - fixed tariffs set every year by ERO (2004)
    - biomass 78 €
    - biomass (co-firing) 63 €
    - wind 84 - 94 €
    - photovoltaics 188 €
    - small hydro 48 €
    - co-generation up to 59 €
- **NEAR FUTURE**
  - unbundling distribution – trade – transmission
  - market trade conditions – 8 regional distribution companies - fixed tariffs would cause different conditions for consumers
  - unified EU system will not be realised in near future

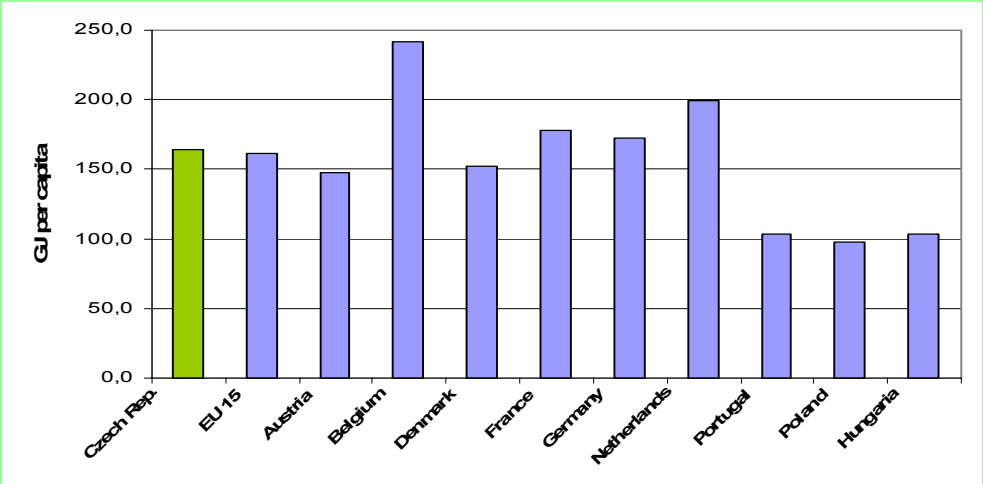
Country Report
Czech Republic

Czech Republic – Basic Data
Primary Sources Consumption



Country Report
Czech Republic

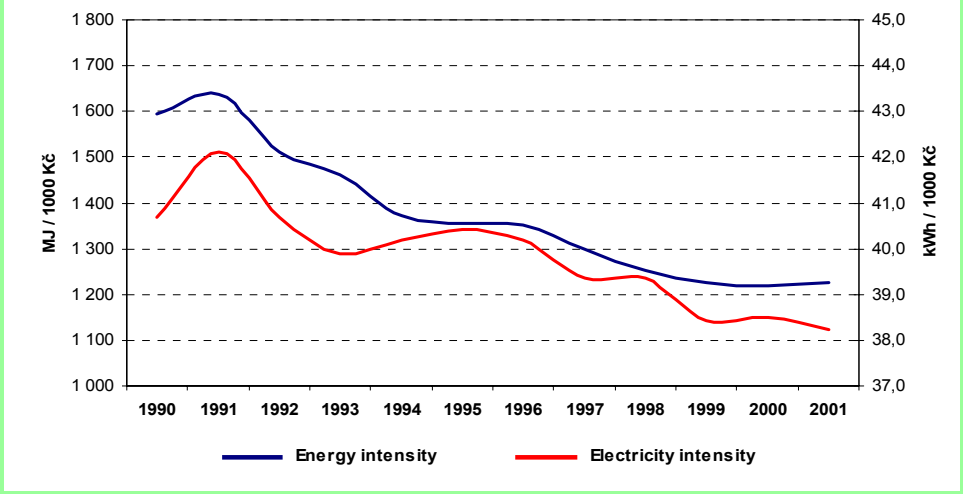
Czech Republic – Basic Data
Specific Consumption per capita



Country Report
Czech Republic

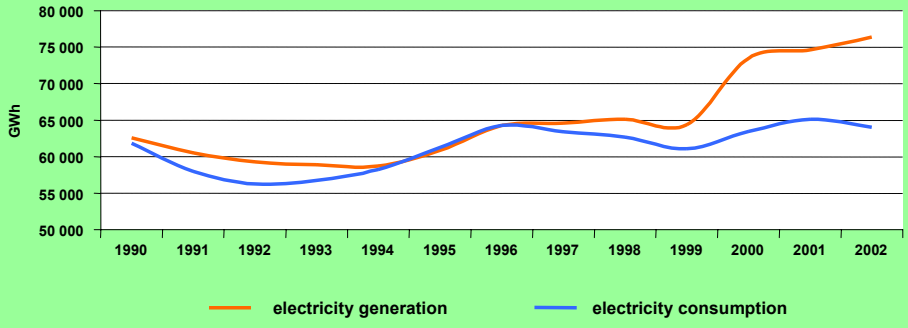
Josef BUBENIK, Czech Energy Agency, Czech Republic

Czech Republic – Basic Data
Energy intensity of GDP



Country Report
Czech Republic

Czech Republic – Basic Data
Electricity generation vs consumption



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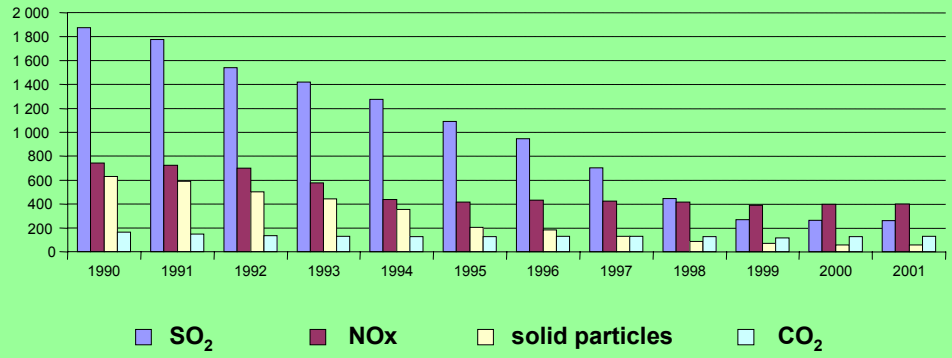
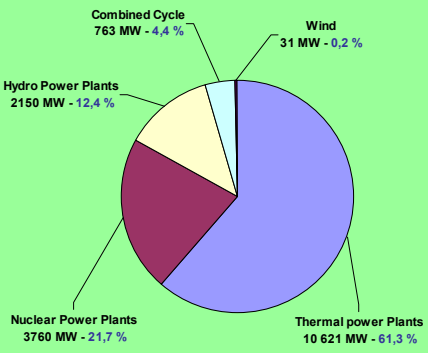
Czech Republic – Basic Data
Emissions

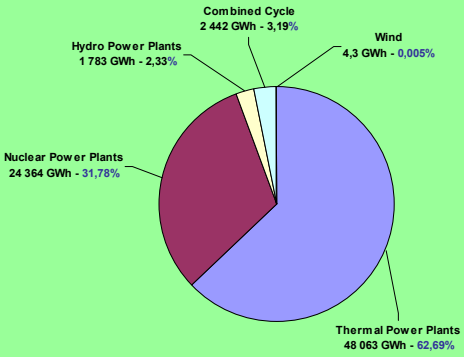


Country Report
Czech Republic

Electricity - Installed capacity vs generation in 2003



Total: 17 325 MWe



Total: 76 658 GWh

Country Report
Czech Republic

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Energy policy

Outlook until 2030 figures

Share of energy resources consumption	2000	2005	2030
Solid Fuels	52,4%	42,5%	30,5%
Brown Coal	36,6%	29,3%	20,8%
Bituminous Coal	15,8%	13,2%	9,7%
Gas	18,9%	21,6%	20,6%
Liquid Fuels	18,6%	15,7%	11,9%
Nuclear	8,9%	16,5%	20,9%
Renewables	2,6%	5,4%	15,7%

Share of electricity production	2000	2005	2030
Solid Fuels	70,5%	55,5%	36,8%
Brown Coal	58,4%	48,9%	31,9%
Bituminous Coal	12,1%	6,6%	4,9%
Gas	6,4%	4,7%	7,2%
Liquid Fuels	2,2%	1,1%	0,4%
Nuclear	18,4%	33,3%	38,6%
Renewables	2,3%	5,3%	16,9%

Country Report
Czech Republic

Ladies and Gentlemen thank you for your attention.

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Country Report
Czech Republic

Josef BUBENIK, Czech Energy Agency, Czech Republic

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

"Country report on electricity end-use efficiency: Estonia"

Madis Laaniste
ESTONIA

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

- main facts about Estonia and electricity consumption structure in Estonia
- changes in electricity prices
- update on policy progress
- development plan for the electricity sector
- background studies for the development plan

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

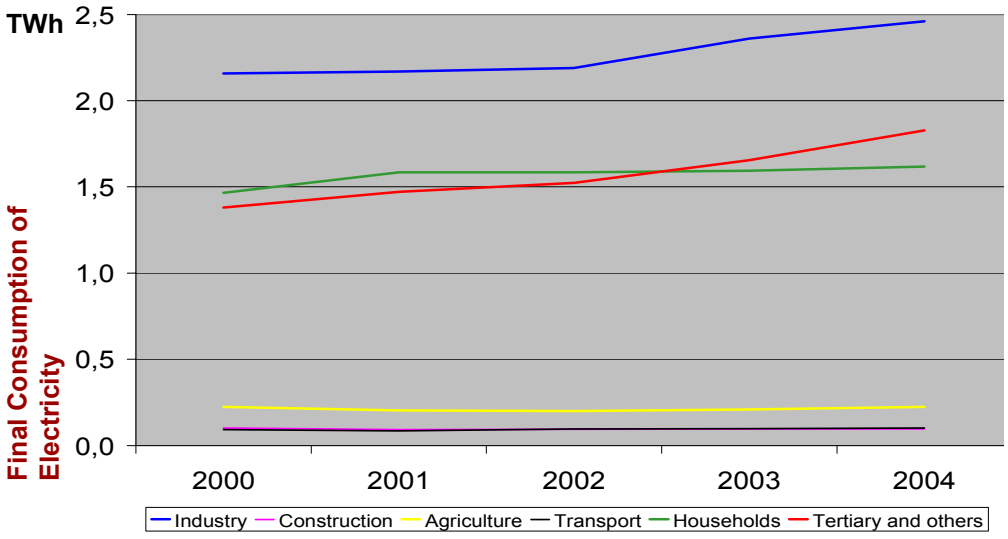
Brief country information

- population: 1 347 000
- share of people living in towns 67%
- area: 45 227 km^2
- GDP 2004: 9043 M€
- GDP/capita: 6713 €
- 565 000 households

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

oil shale (2003):
- **TPES 65 %**
- **electricity generation 93 %**

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS



2004: 39% 26% 29%

Source: ESO www.stat.ee (NB! Industry includes mining activities)

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Household equipment penetration levels, %

	Gas stove ↘	Electrical stove ↗	Stove on solid fuel ↘	Refrigerator ↗	Washing machine ↗
2000	42,1	51,0	33,2	92,1	76,3
2001	40,6	52,3	33,4	92,5	77,1
2002	38,9	53,8	32,7	93,1	78,4
2003	37,2	57,4	32,0	92,7	77,8
2004	38,0	57,8	31,3	93,0	79,2

	Color TV ↗	VHS ↗	Radio	Dishwasher ↗	Microwave oven ↗
2000	90,5	27,7	89,0	1,5	22,2
2001	91,6	30,8	89,6	1,8	26,0
2002	93,9	31,4	89,3	2,3	29,8
2003	93,2	35,1	86,5	2,7	32,6
2004	94,1	36,8	88,0	3,1	36,1

Source: ESO

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Potential for further growth - households

- Dishwashers [Estonia now 3%, Western Europe 40%]
- Tumble dryers [Estonia now < 5%(?), Western Europe 30%]
- Washing machines [Estonia now 80%, Western Europe 90%]
- electrical water and sauna heaters
- heat pumps, air conditioners

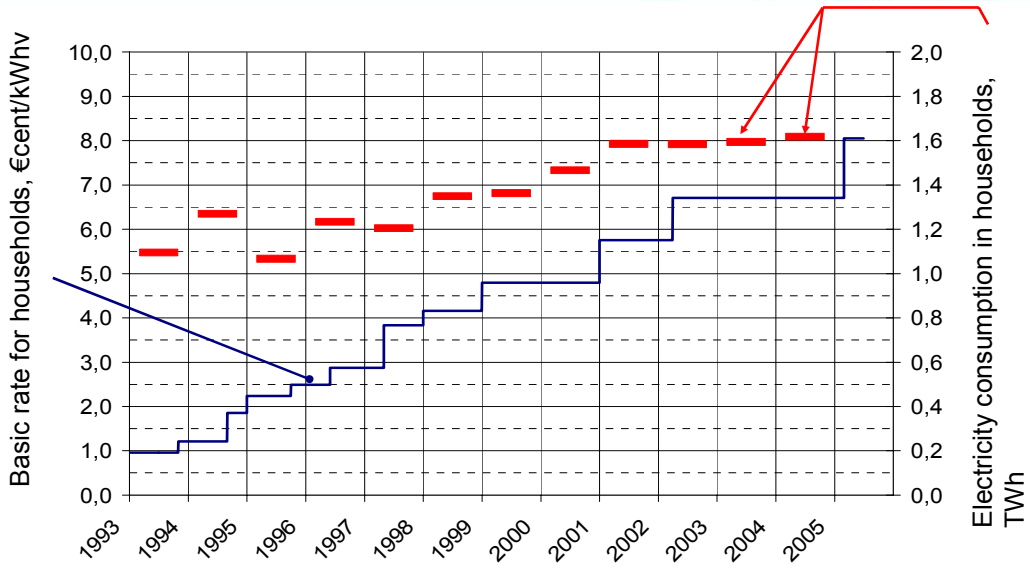
MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Electricity consumption structure of household equipment

lighting	15,0%
stoves	12,5%
refrigerators	12,5%
washing machines	10,0%
heating	10,0%
TV, HiFi, PC	10,0%
other equipment	30,0%

Total electricity consumption of households in 2004: 1618 GWh (ESO)

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS



Source: ESO, personal observations

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Policy development (1/2)

- 16.12.2004 the Parliament endorsed new long-term energy and fuel sector development plan
- emphasises the need for rational use of energy and adopts ambitious target – avoid further growth of TPES from the level of year 2003 until 2010
- sets the instruments for EE policy – national energy efficiency target programme, tax policy, legislation, energy-related R&D
- urges the government to design and implement target programmes and action plans, incl for rational use of energy
- insists the need for energy audits and ESCO's

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Policy development (2/2)

- national electricity sector development plan is currently under preparation, will be submitted to parliament in autumn
- the plan should (Electricity Market Act):
  - estimate consumption and generation/transmission capacity needs
  - analyse the results of Electricity Market Act and policy implementation
  - propose the measures to achieve policy goals, incl for demand management
- motivation for demand management
  - reduce the need for new generation capacities
  - enhance balancing options (increased demand due to RES-e growth)

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Demand management in households

- application of indirect options – pricing structure
  - mainly impact to operation of electrical heating (already achieved)
- application of direct demand management, particularly for water heaters and additional heating equipment
  - at the moment, the penetration level of electrical water heaters is 15%, installed capacity 100 MW
  - additional heating equipment in 14% of households – low simultaneous use, but still 36 MW
  - according to the retailers, the installed capacity of floor heating is 130 MW (incl industry and services)

potential of direct demand management is 75 MW, might grow to 90 MW in 2017 (3..4% of needed capacity)

THEORETICAL

Source: TUT

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Implementation of demand management

- average range (on daily basis) of peak load in 2007 will be 60..75 MW, the direct demand management in all sectors has a potential to smooth the peaks almost throughout the year
- compared to an oil-shale fuelled thermal power station block (2..3 MW/min), direct demand management has much faster characteristics (5..10 MW/min)
- grouped direct demand management above 28..30 MW might be a feasible option to smooth the peak loads (marginal costs are lower than for gas turbines)

Source: TUT

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Current activities in EE field

- transposition of EPBD
- energy audit support scheme for apartment buildings was launched on July, 4th

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Conclusions

- the use of electrical household appliances is increasing while electricity consumption in households has stabilised
- strong economic growth contributes a wider use of electrical appliances in households and generates additional electricity demand, especially in rich households
- data on electricity consumption in tertiary sector are not sufficient (too many aggregated sectors), auditing practice has limited distribution still
- new national strategy recognises the need for EE activities
- direct demand management is a competitive alternative for new system balancing generation capacities

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Thank you!

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SLOVENIA

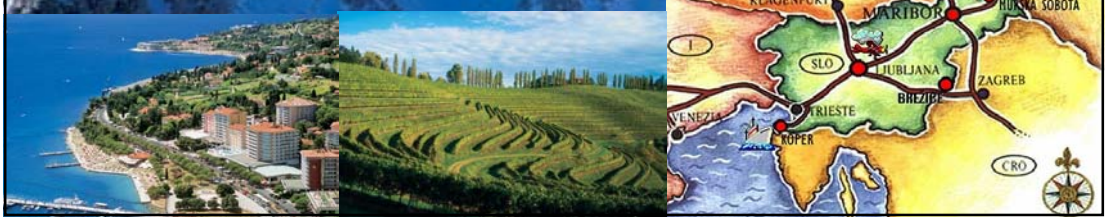
Country Report:

Status of Electricity End-Use Efficiency in Buildings and Energy Services

Energy Efficiency Centre at "Jožef Stefan" Institute,

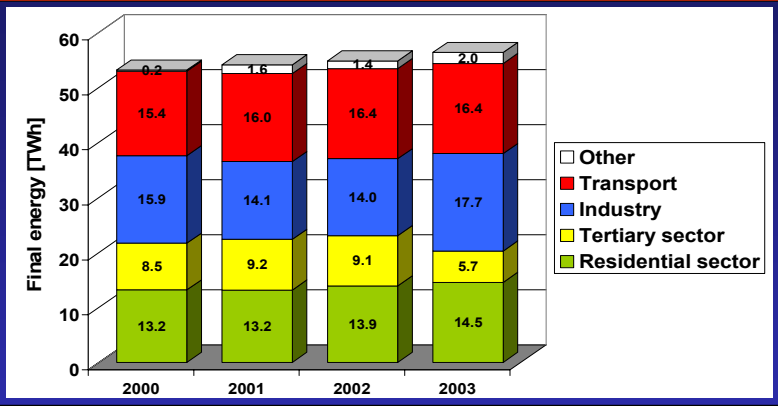
Brief Slovenia presentation

- Population: 2 million
- Area: 20,273 km^2
- GDP: 24,592 million EUR
- GDP/capita:12,273 EUR (2003)



Andreja URBANCIC, Institut Jozef Stefan, Slovenia

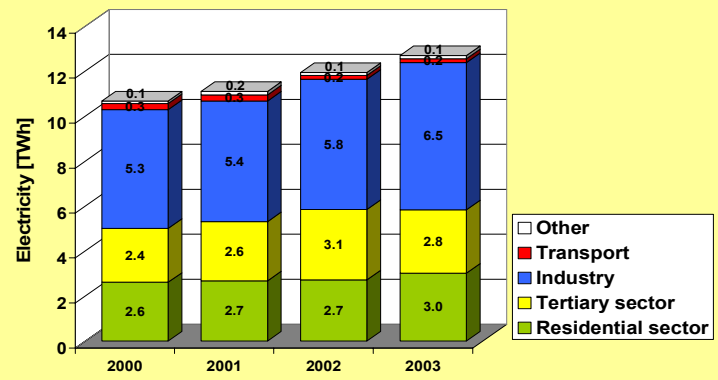
FINAL ENERGY CONSUMPTION



[TWh]	2000	2001	2002	2003	2004 (estimation)
Residential sector	13.2	13.2	13.9	14.5	
Tertiary sector	8.5	9.2	9.1	5.7	
Industry	15.9	14.1	14.0	17.7	
Transport	15.4	16.0	16.4	16.4	
TOTAL	**53.1**	**54.1**	**54.8**	**56.3**	

3

ELECTRICITY CONSUMPTION



Electricity price

(Eurostat, without tax):

1. Residential:
   Dc: 84 Euro/MWh
2. Tertiary/industry:
   Ia: 98 Euro/MWh
   Ig: 54 Euro/MWh

[TWh]	2000	2001	2002	2003	2004 (estimation)
Residential sector	2.6	2.7	2.7	3.0	
Tertiary sector	2.4	2.6	3.1	2.8	
Industry	5.3	5.4	5.8	6.5	
Transport	0.3	0.3	0.2	0.2	
TOTAL	**10.7**	**11.1**	**11.9**	**12.7**	**+ 1,6% ?**

4

ELECTRICITY CONSUMPTION IN TERTIARY SECTOR

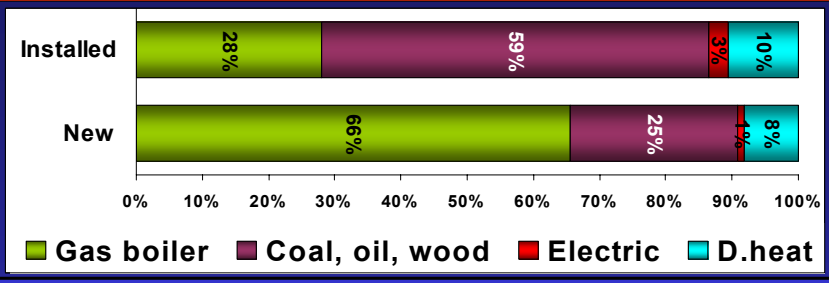
- The share of tertiary sector energy consumption in the total energy consumption [%]: **17%**
- The share of electricity consumption in the total energy consumption for tertiary sector [%]: **28%**
- Average electricity consumption per m^2 in buildings from tertiary sector [$kWh/m^2/yr.$]: **?**
- The share of buildings with air-conditioning systems [%]: **28% (estimate)**

ELECTRICITY CONSUMPTION IN TERTIARY SECTOR (2)

	1998	1999	2000	2002
Number of PCs per 10 employees				
Small enterprises	3.1	3.2	3.9	4.3
Medium-sized enterprises	2.2	2.5	3.1	3.3
Large enterprises	1.8	2.1	2.4	3.1
Number of PCs per 100 pupils				
Elementary schools	3.1	4.0	4.5	6.1
Secondary schools	3.8	4.0	4.1	5.9

Source: Faculty of Social Sciences, Statistical Office of the Republic of Slovenia

HEATING IN TERTIARY SECTOR



Non-residential Buildings heating systems (2000 - estimate)

	Gas boiler	Coal/oil/wood boiler	Electric heating	District heating
Share of different type of installed heating systems [%]	28	59	3	10
Market share of heating systems for new non-residential buildings [%]	65	25	1	8

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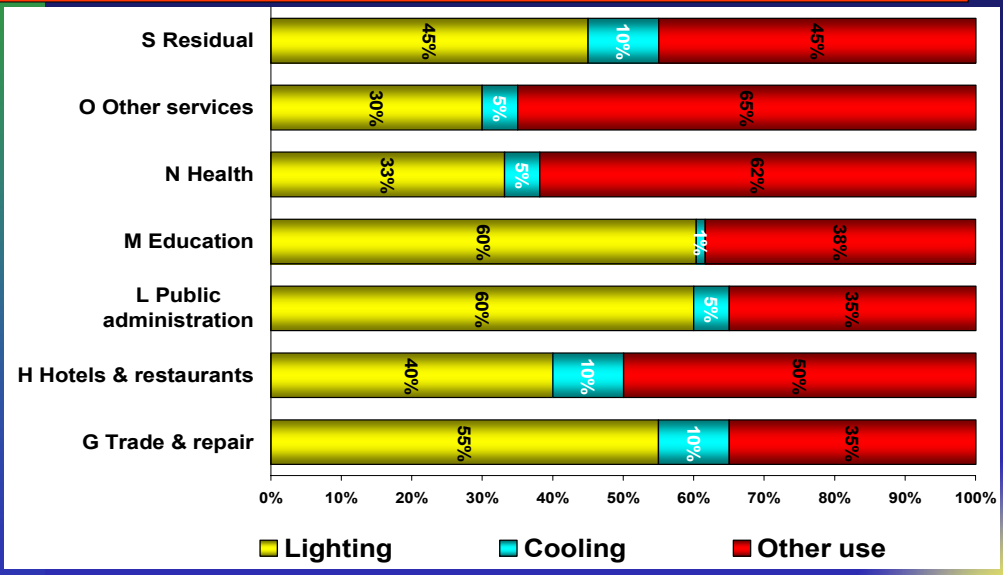
ELECTRICITY CONSUMPTION IN TERTIARY SECTOR



Source: MESAP Energy model of Slovenia (expert estimate, 2000)

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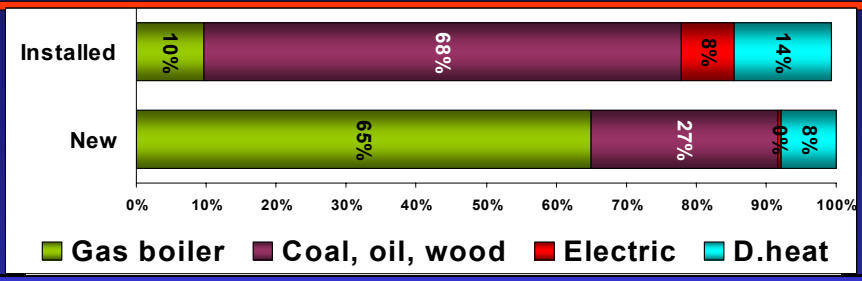
RESIDENTIAL SECTOR

- Number of households: **777,772** *(2002)*
- Average area of a household: **74.6 m²** *(2002)*
- Average number of inhabitants per one household: **2.9**
- Average number of light points per household: **~ 19**
- Average number of CFL per household: **~ <1**
- Households with at least 1 CFL: **~50%**
- Share of household expenditure for electricity consumption from total household income (2001):
  - **Allocated assets: 15.000 EUR**
  - **Electricity: 420 EUR / 2.8%**

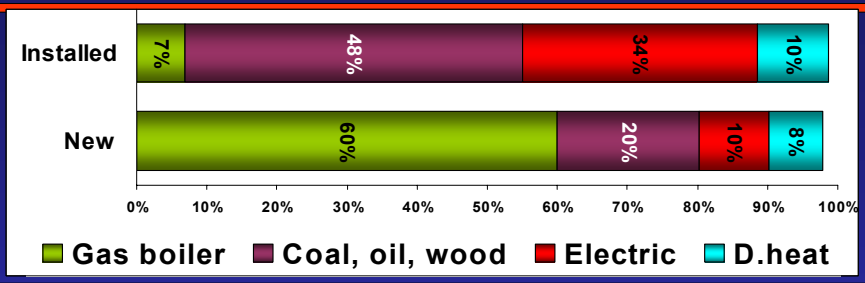
HEATING IN RESIDENTIAL SECTOR



Household heating systems (2002 – SORS, New - estimate)

	Gas boiler	Coal/oil/wood boiler	Electric heating	District heating
Share of different type of installed heating systems [%]	10	68	8	14
Market share of heating systems for new residential buildings [%]	65	27	0.5	8

HOT WATER PREPARATION IN RESIDENTIAL SECTOR



Household hot water (2002 – SORS, New - estimate)

	Gas boiler	Coal/oil/wood boiler	Electric heating	District heating
Share of different type of installed hot water systems [%]	7	48	34	10
Market share of hot water systems for new residential buildings [%]	60	20	10	8

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ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR

- The yearly average electricity consumption per m^2 for lighting: ~ 5.5 [kWh/m^2/yr.]

Lighting equipment for households (uncertain estimate!)

	Linear fluorescent	CFL	Low voltage halogen	High wattage upright halogen	Incandescent lamp
Market share of new sales [%]	5	20	15	1	59
Share of installed lighting equipment [%]	~ 20 % of efficient energy lamps ?				

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ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR (2)

Percentage of households equipped with different types of audio-video electronics [%]	TV satellite receiver	VCRs	DVD players
	~ 15 52% of household with cable TV.	63 (2002)	~ 10 (Market break through in 2004)

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR (3)

- The average overall stand-by power in households (for all appliances and consumer electronics): **~ 25 W**
- Are the EU Energy Labels of appliances easy to be observed in point of sale? **YES**

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR (4)

The 5 largest electricity using equipments and the share of each one in the total electricity consumption of the household (2003)

No.	Equipment (lighting, PCs, cooling, etc.)	Average consumption [kWh/yr.]	Share in total [%]
1	Refrigerators & freezers	940	23.6
2	Water heaters	770	19.3
3	Lamps	495	12.4
4	Heating technologies	349	8.8
5	Washing machines	320	8.0

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR (5)

	Do you find A class appliances in shops? [Y / N]	Sales share of A class appliances on national market [%]	Sales share of B class appliances on national market [%]	Sales share of C class appliances on national market [%]	Sales share of less than D class appliances on national market [%]
Refrigerator	Y	43	43	11	3
Freezer	Y	50	35	10	5
Clothes washing machine	Y	65	30	4	1
Dishwasher	Y	57	33	9	1
Air conditioning					
TV					

Share of installed appliances with the label (up to 6.4% of all installed),
Survey of the households, SORS, 2002.

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR (6)

	Level of the appliances penetration in households [%]	Typical energy consumption of installed appliances [kWh/yr.]
Refrigerator	98	516
Freezer	69	609
Clothes washing machine	95	326
Dishwasher	39	525
Air conditioning	3	512
TV	97	166

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR (7)

	The major brand on national market [companies name]	Which are the local / national producers? [companies name]
Refrigerator	Gorenje	Gorenje
Freezer	Gorenje	Gorenje
Clothes washing machine	Gorenje	Gorenje
Dishwasher	Gorenje	Gorenje
Air conditioning	LG	Gorenje
TV	?	Gorenje

CONCLUSIONS

- Low data available on lighting and energy data in tertiary sectors
  - big saving potential
- Households:
  - significant efficiency increase of new appliances
    - income tax exemption for class A
    - educational and averness campaigns
    - additional appliances in households (refrigerators, TV, HI-FI,...)
  - under–rated electricity prices

NATIONAL POLICY ON ENERGY EFFICIENY

National Energy program (2003):

- Long-term strategic orientation to increase of energy efficiency in all sectors of energy use:
  - 2.5%/a decrease of energy intensity
  - increase of energy efficiency till 2010 compared to 2004 for:
    - 10% in industry and service sector
    - 10% in buildings
    - 15% in public sector
      - » ministry agreement for 13% decrease of energy use in hospitals
  - list of instruments for achieving set targets
  - **~ 60 million EUR/year necessary funds for RES & EEU**

POLICY IMPLEMENTATION

Legislation:

- implementation of IPPC directive for industry
- Emission trading
- CO_2 tax
  - exemptions - contracts for specific emissions decrease
- EU legislation implementation
  - energy labelling, minimum efficiency, building performance,...

Main policy actors:

Agency for efficient energy use and renewable energy sources

- **energy advising and consulting,**
- **financing of energy audits, feasibility studies,...**
- **subsiding of RES and EEU measurers**
- **legislation and standards preparation**
- **promotion and education**

since 1.1.2005 part of
Ecologic developing found of the Republic of Slovenia

- **project financing (loans with subsidised rate)**

ENERGY SERVICES

- Energy market implementation:
  - More active role of energy suppliers
    - electricity trading departments of distribution companies (DSM)
- Third party financing:
  - new approach for implementation
    - some projects already started
    - target public sector
- Oil companies (Istrabenz, Petrol):
  - new player with investment capital (TPF, ESCO, ...)

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Thank you for your attention!

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SLOVAK REPUBLIC

Country Report:

Status of Electricity End-Use Efficiency: Slovak Republic

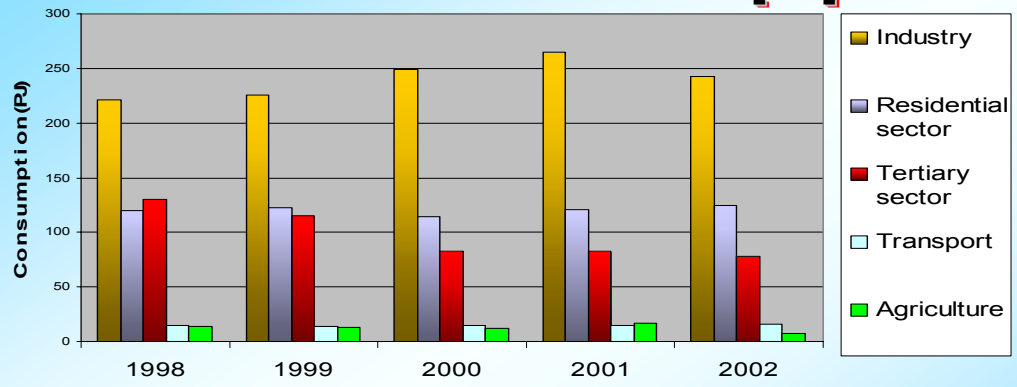
Marián Honaizer, Slovak Energy Agency,
marian.honaizer@sea.gov.sk

A short view on SLOVAKIA

Population: 5 380 000, 2003
Area: 49 034 km^2
GDP: 18.79 bil. EUR 2003,
cp 95
GDP/cap: 5357 EUR/cap crrp

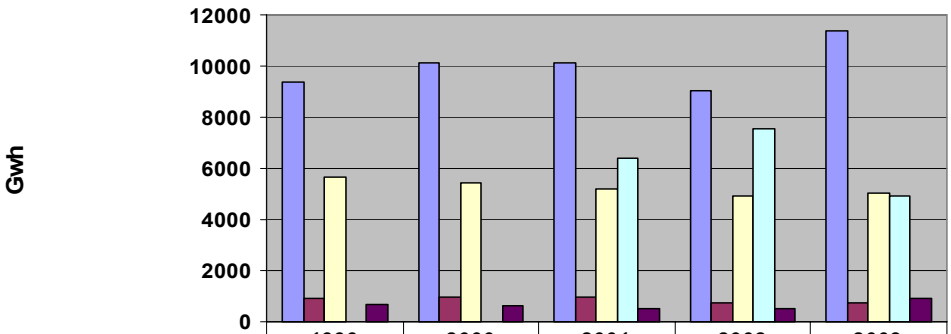
Electricity price
Tertiary/Industr.:
0,067 EUR/kWh 2004
Residential:
0,099 EUR/kWh 2004

ENERGY CONSUMPTION [PJ]



	1998	1999	2000	2001	2002
Industry	221	226	249	265	242
Residential sector	120	123	114	121	124
Tertiary sector	130	115	83	83	78
Transport	15	14	15	15	16
Agriculture	14	13	12	17	7
Total	500	491	473	501	467

ELECTRICITY CONSUMPTION [GWh/sector]



	1999	2000	2001	2002	2003
Industry	9389	10099	10099	9019	11346
Transport	903	965	965	720	726
Residential sector	5672	5419	5222	4907	5039
Tertiary sector	0	0	6378	7552	4926
Agriculture	689	617	529	514	915

ENERGY CONSUMPTION IN TERTIARY SECTOR

- **The share of tertiary sector energy consumption in the total energy consumption: 16,7%**
- **The share of electricity consumption in the total energy consumption for tertiary sector: 21,46%**

New conditions in 2003

The year 2003 was the year, in which the Regulatory Office for Network Industries accepted in a full extent the responsibility for state regulation in the energy sector, including price regulation, which had been carried out by the Ministry of Finance of the Slovak Republic until the end of 2002.

By releasing Decree No.1/2003 the Regulatory Office determined for regulated companies the prices and tariffs for:

- Electricity generation
- Balancing /ancillary/ services
- System costs
- Electricity transmission via the transmission system
- Electricity distribution according to individual voltage levels
- Electricity supply for regulated consumers

A significant implication resulting from such change in electricity prices regulation was the removal of cross-subsidies almost in all price and tariffs determined.

Marian HONAIZER, Slovak Energy Agency, Slovak Rep.

ELECTRICITY CONSUMPTION IN TERTIARY SECTOR

Non-residential Buildings heating systems (2003)

	Gas boiler	Coal/oil/wood boiler	Electric heating	District heating
Share of different type of installed heating systems [%]	66	18	1	15
Market share of heating systems for new non-residential buildings [%]	70	8	0	22

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR

Household heating systems (2003)

	Gas boiler	Coal/oil/wood boiler	Electric heating	District heating
Share of different type of installed heating systems [%]	63	5	1	31
Market share of heating systems for new residential buildings [%]	68	6	1	25

Marian HONAIZER, Slovak Energy Agency, Slovak Rep.

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR

Household hot water (2003)

	Gas boiler	Coal/oil/wood boiler	Electric heating	District heating
Share of different type of hot water systems for households [%]	14	1	40	45
Market share of hot water systems for new residential buildings [%]	20	0	35	45

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR

Share of electricity consumption: 16,7%

Number of residential buildings: 1 034 287

Number of flats: 1 884 846

Average area of a flat: 83,9 m^2

Average nr. of inhabitants/flat: 3,18

Lighting

Light sources	Total	Bulbs	Saving lamps	Fluorescent lamps
In Nr. of flats	1 884 846	1 884 846	887 265	703 369
Pcs. In all flats	30 949 589	26 749 508	2 477 900	1 722 181
Average output per each unit /kWh/	55,7	60,55	14,49	39,76
Installed capacity /kWh/	1 724 062	1 619 683	35 905	68 474
Utilized capacity at 20% /kWh/	**344 812**	**323 937**	**7 181**	**13 695**

Household electric heating

	In Nr. of flats	in %
	1 884 846	**100 %**
Electric boilers	**88 588**	**4,7**
Electric convectors	**36 189**	**1,92**
Accumulative furnaces	**5 278**	**0,28**
Total	**130 055**	**6,9**

Marian HONAIZER, Slovak Energy Agency, Slovak Rep.

Kitchen appliances

Kitchen appliance	In Nr. of flats	kitchen appliance	In Nr. of flats
	1 884 846		1 884 846
Combined refrigerators	1 428 216	Cooking pots	845 654
Refrigerators	523 500	Toasters	578 535
Freezers	876 526	Robots	191 950
Dishwashers	103 758	Flat irons	800 480
Microwaves	347 136	Sewing-machines	5 769
		Vacuum cleaners	180 193

Household appliances

Washing-machines	In Nr. of flats	audio-video	In Nr. of flats
	1 884 846		1 884 846
Classic washing-machines	193 292	VCR	934 246
Automatic washing-machines	1 699 362	PC	785 250
Washing dryers	53 692	Audio	1 489 962
Hair dryers	1 061 496	TV	1 863 123

ELECTRICITY CONSUMPTION IN RESIDENTIAL SECTOR

	Level of the appliances penetration in households [%]	Typical energy consumption of installed appliances [kWh/yr.]
Refrigerator	99,1%	347 [kWh/yr.]
Freezer	99,1%	347 [kWh/yr.]
Clothes washing machine	60,3%	504 [kWh/yr.]
Dishwasher	2,3%	472 [kWh/yr.]
Air conditioning	n.a.	n.a.
Colour TV	83,7%	88 [kWh/yr.]

CONCLUSION – ELECTRICITY END-USE EFFICIENCY

Almost 70% of buildings-old build standards (1970)

Rising efficiency in these buildings- high costs

New buildings-situation much better

Public sector (15 000 buildings)- high potential

New stronger incentives and measures needed

REGULATORY FRAMEWORK

- **Energy policy 2000**
- **Energy act**
- **Act on heat energy**
- **Act on regulation in network industries**
- **Government regulations on:**
  - **energy labelling,**
  - **minimum energy efficiency.**

ENERGY SERVICES IN SLOVAKIA

- Ministry of Economy of the Slovak Republic
- Ministry of Environment SR

- Slovak Energy Agency
- Energy Centre Bratislava

- Regional Energy Agency
- ESCOs companies

ENERGY SERVICES IN SLOVAKIA

- Sectoral operational plan Industry and Services:
  - 1.4. Promotion of energy savings and the use of renewable energy sources
- De minimis scheme
- SAVE II, Intelligent Energy – Europe
- Educational and information campaigns

ENERGY SERVICES IN SLOVAKIA

- non-sufficient attention to control the energy flows
- limited financial sources of individual operators
- relatively high kickoff costs
- inadequate orientation in the area

CONCLUSION – ENERGY SERVICES

- promotion of CHP
- introduction of energy audits
- dissemination of best practices
- promotion of third party financing (public sector)
- promotion of energy efficiency in the public buildings sector
- improvement of metering in individual households

THANK YOU

FOR YOUR ATTENTION

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Bogdan Atanasiu, Paolo Bertoldi
European Commission, DG JRC

"Report on Electricity End-use Consumption in New MS and CC in Tertiary and Residential Sectors"

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ABSTRACT

The report present the first results of JRC project on electricity end-use efficiency in buildings in NMS, CC and WB comprising an analysis of data on the installed end-use technologies (penetration rate, usage pattern, specific energy consumption, etc.), an evaluation of the corresponding electricity use and an estimation of the electricity savings potential.

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AIM AND OBJECTIVES

- **Started** in mid-2004
- **The aim** is to develop an end-use electricity consumption model for the building sector and to evaluate the electricity saving potential in the tertiary and residential sectors of New MSs and CCs and propose ways to achieve it
- **Geographical coverage:** New EU MS, Bulgaria, Romania and Turkey; we have already expanded to the Western Balkans.

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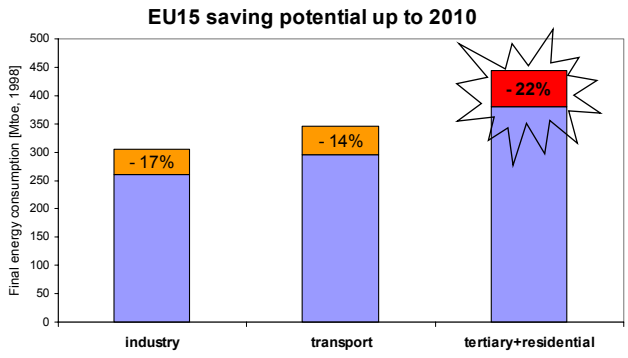
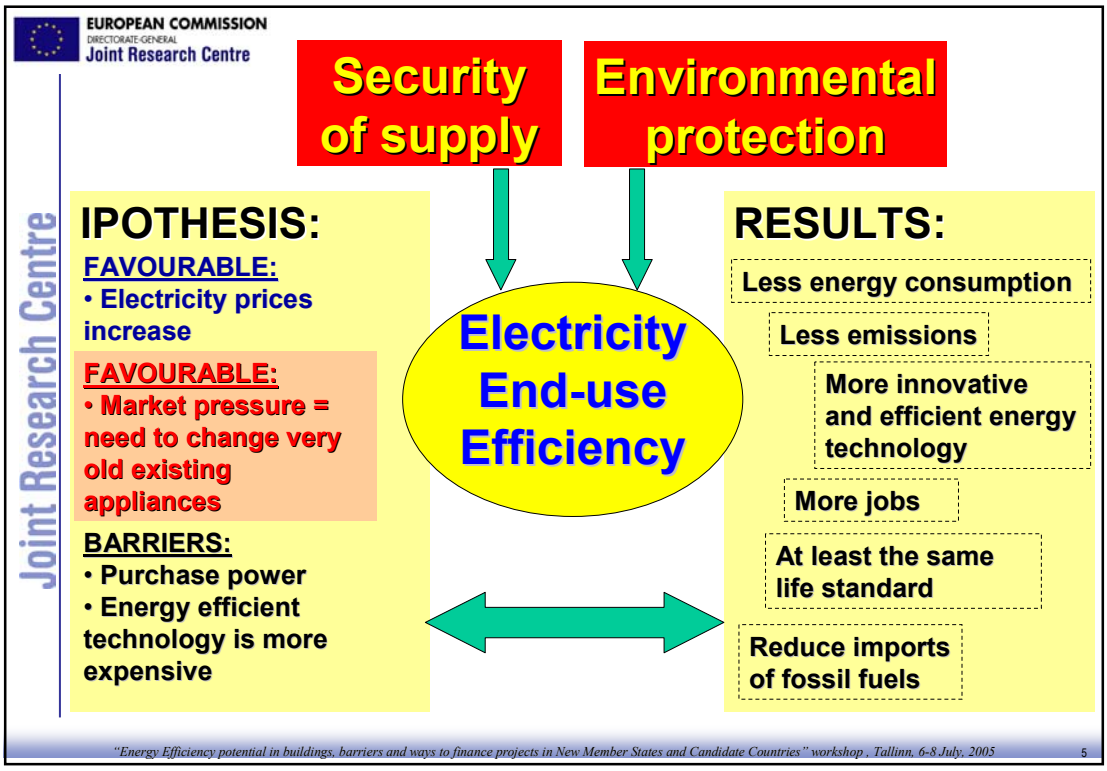
ENERGY SECTORS TO SURVEY

TERTIARY AND RESIDENTIAL SECTORS

Why these sectors? - 22% of Kyoto Protocol commitment…



Source: MURE model, EC 2003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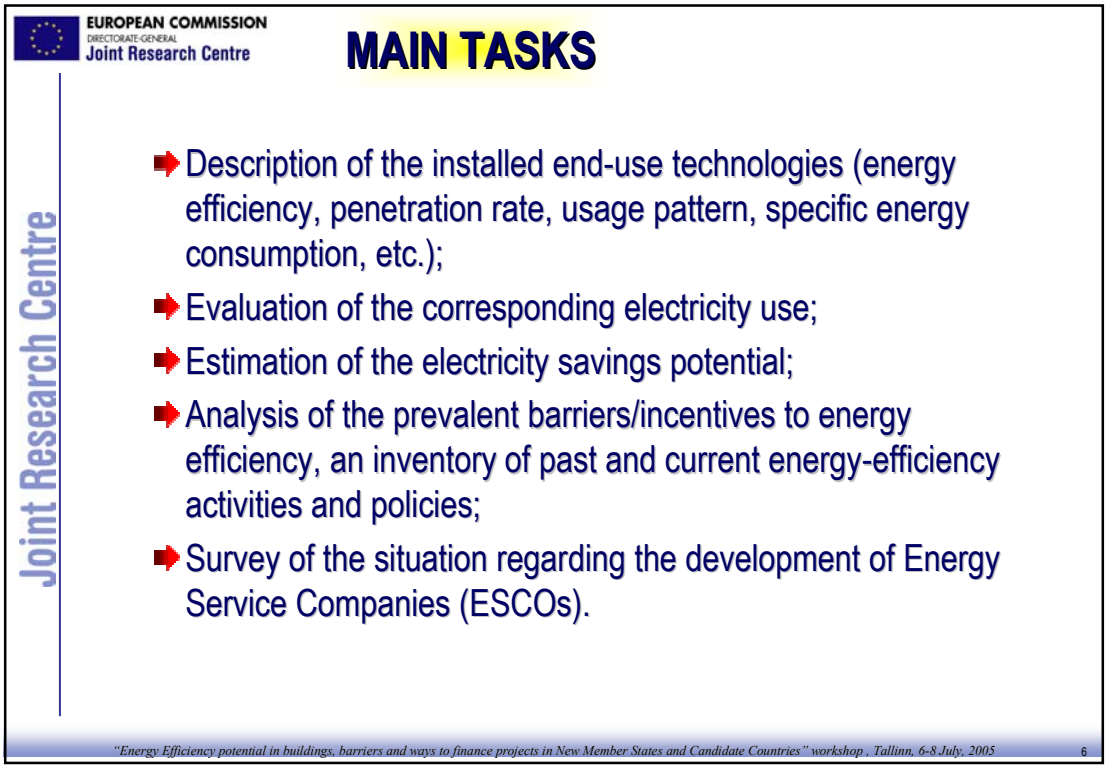
Security of supply
Environmental protection
IPOTHESIS:
FAVOURABLE:
• Electricity prices increase
FAVOURABLE:
• Market pressure = need to change very old existing appliances
BARRIERS:
• Purchase power
• Energy efficient technology is more expensive
Electricity End-use Efficiency
RESULTS:
Less energy consumption
Less emissions
More innovative and efficient energy technology
More jobs
At least the same life standard
Reduce imports of fossil fuels
"Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries" workshop , Tallinn, 6-8 July, 2005
5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MAIN TASKS
Description of the installed end-use technologies (energy efficiency, penetration rate, usage pattern, specific energy consumption, etc.);
Evaluation of the corresponding electricity use;
Estimation of the electricity savings potential;
Analysis of the prevalent barriers/incentives to energy efficiency, an inventory of past and current energy-efficiency activities and policies;
Survey of the situation regarding the development of Energy Service Companies (ESCOs).
"Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries" workshop , Tallinn, 6-8 July, 2005
6

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PRELIMINARY FINDINGS

- Expert workshop to kick start data collection process (21-22 October 2003, Ispra, Italy);
- Second expert workshop (9-10 December 2004, Brussels, Belgium);
  - Proceedings on-line:
    http://energyefficiency.jrc.cec.eu.int/html/Workshop_EE_9.12.04.html
- Data collection: individual experts from energy agencies, academia, ministries and official sources, such as central statistical offices.
- On-going gathering and modeling data collection even we still have to collect more…first results will be presented in the follows

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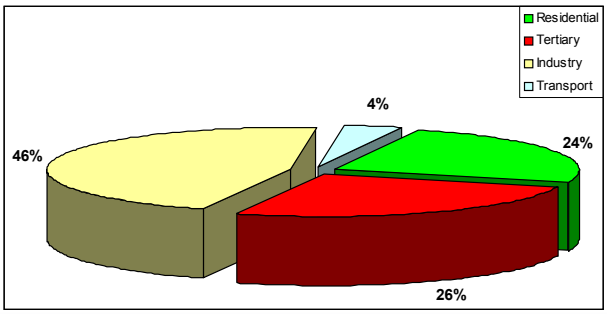
ELECTRICITY END-USE CONSUMPTION

- Residential and tertiary sectors from NMS and CC account 50% of total electricity consumption
- It is a great amount of potential electricity savings
- At the end of the 80's the shares were much different than now, at that time industry accounted for the greatest share of electricity consumption, residential and tertiary being much lower in all CEEC's than in EU-15.



(source JRC)

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ELECTRICITY END-USE CONSUMPTION (1)

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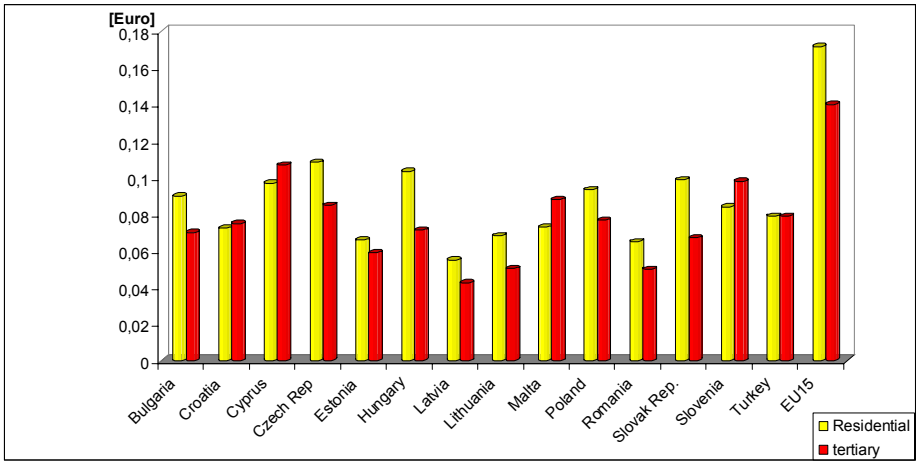
For the design of any policy targeted to the end-use sectors, or understanding the drivers of demand, it is necessary to review the level of energy prices.



(source Eurostat)

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TERTIARY AND RESIDENTIAL SECTORS (1)

Joint Research Centre

Considering that the trend for the electricity price is to increase and that the energy markets in NMS, CC and WB are on the way of liberalisation we can say that now is the right moment to foster energy saving measures in these sectors with several important benefits:

- improve economic efficiency
- avoid the construction of new power generation capacities for overcoming the necessary phase out of old fossil and nuclear plants
- ease the social burden of hiking energy prices through reduced consumption
- improve energy security in countries depending on power imports.

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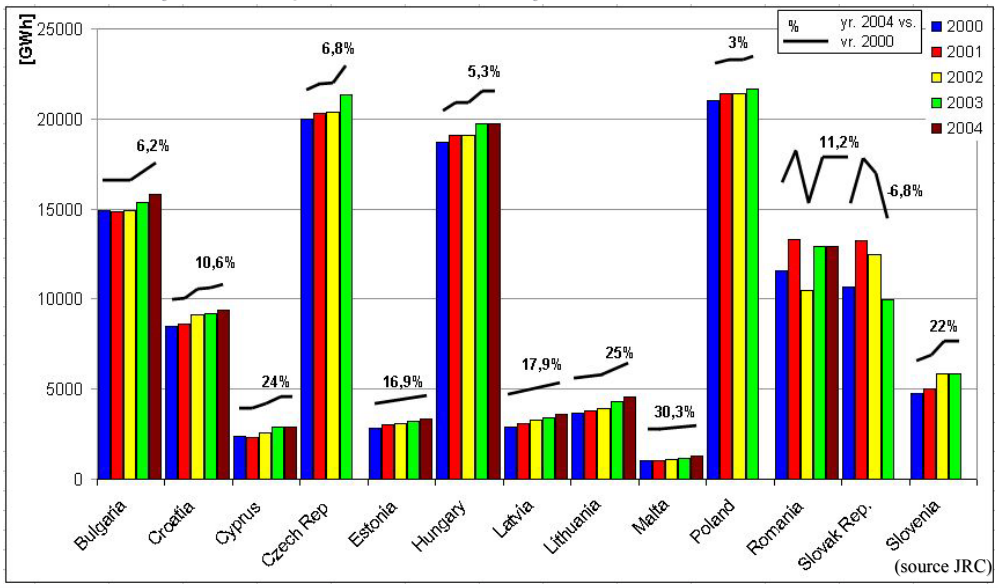
TERTIARY AND RESIDENTIAL SECTORS (2)

Joint Research Centre

Electricity consumption in the last 5 years (for 2004 only estimation)



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RESIDENTIAL SECTOR

Joint Research Centre

- Breakdown of electricity use according to major types of appliances; ownership levels; average specific energy consumption of appliances
- Not all appliances are covered in breakdowns
  - lighting, cold appliances and washing machines are the most important regarding electricity consumption
- Appliances sales
  - the market is on a good way?
  - what is the share of efficient appliances?

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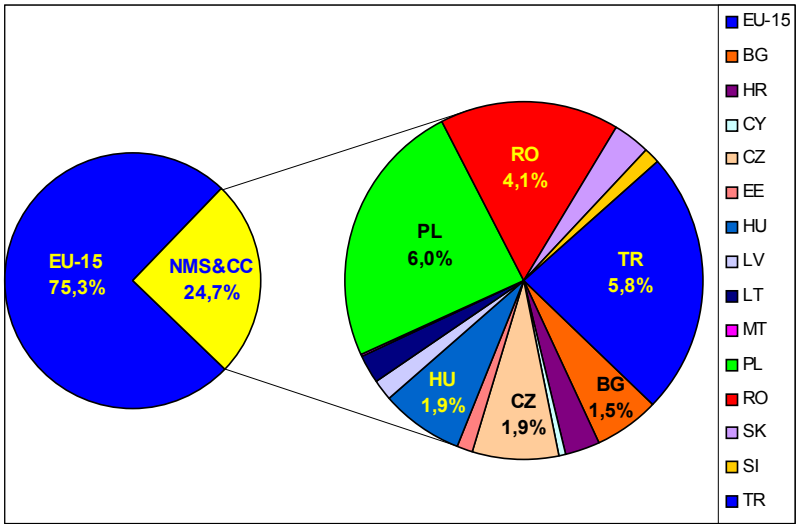
RESIDENTIAL - HOUSEHOLDS

Joint Research Centre

Households from NMS, CC and WB will contribute with 25% to the residential sector of an enlarged EU…



(source JRC)

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RESIDENTIAL - POPULATION

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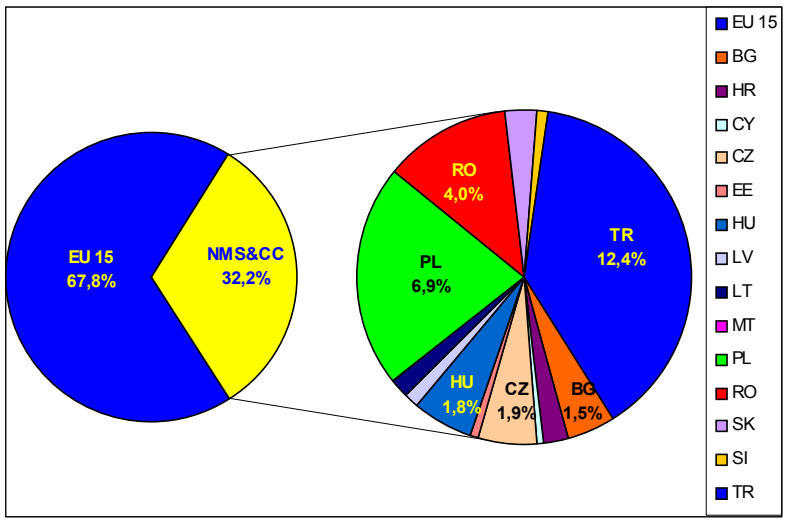
…and with 32% to total population of an enlarged EU



(source JRC)

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RESIDENTIAL –AVERAGE AREA OF HSHLDS.

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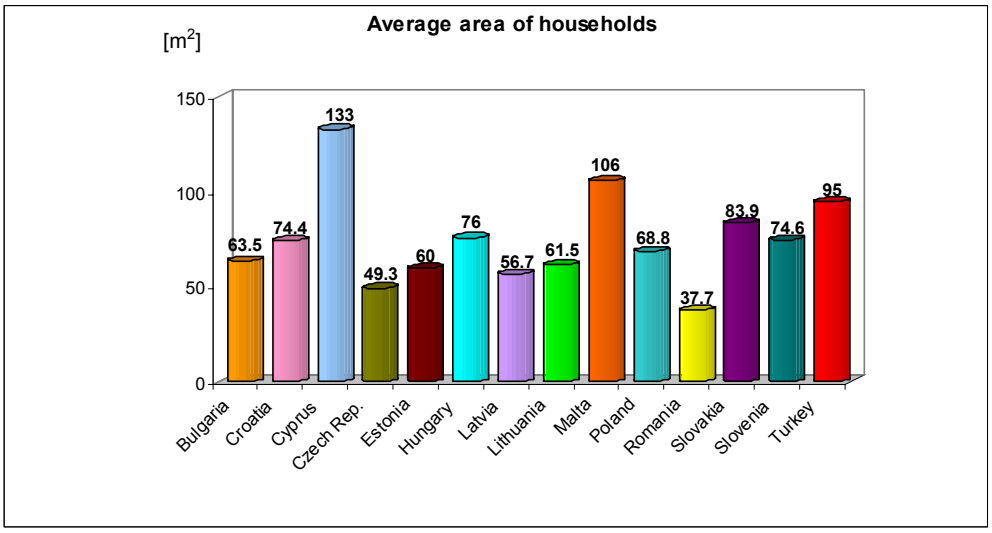

(source JRC)

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RESIDENTIAL – CONSUMPTION (1)

Cumulated consumption in New MS and CC (yr. 2003, except Turkey) = **85,45 TWh**

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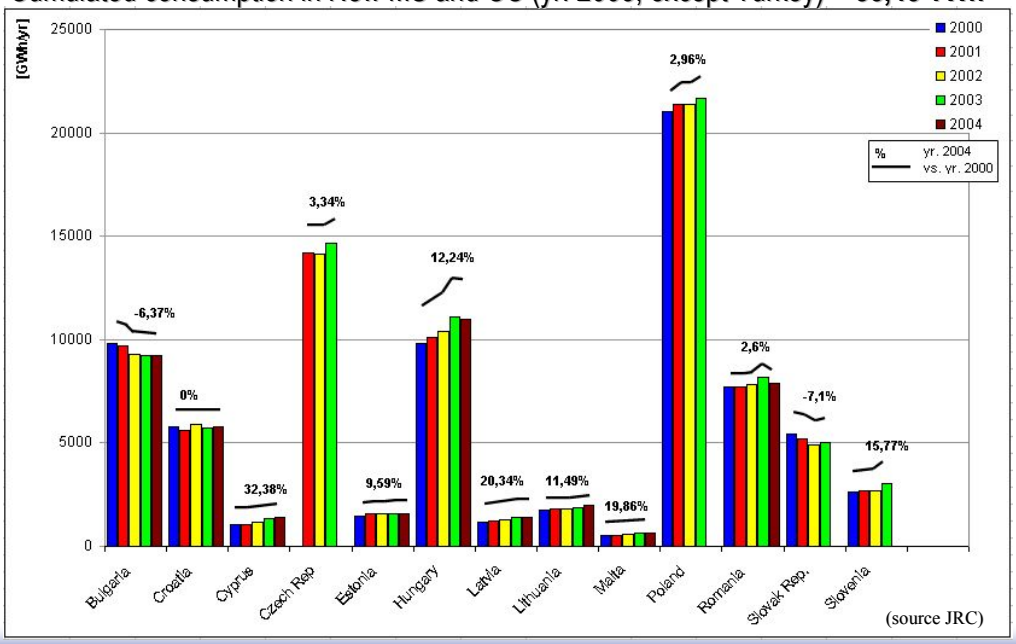

(source JRC)

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RESIDENTIAL – CONSUMPTION (2)

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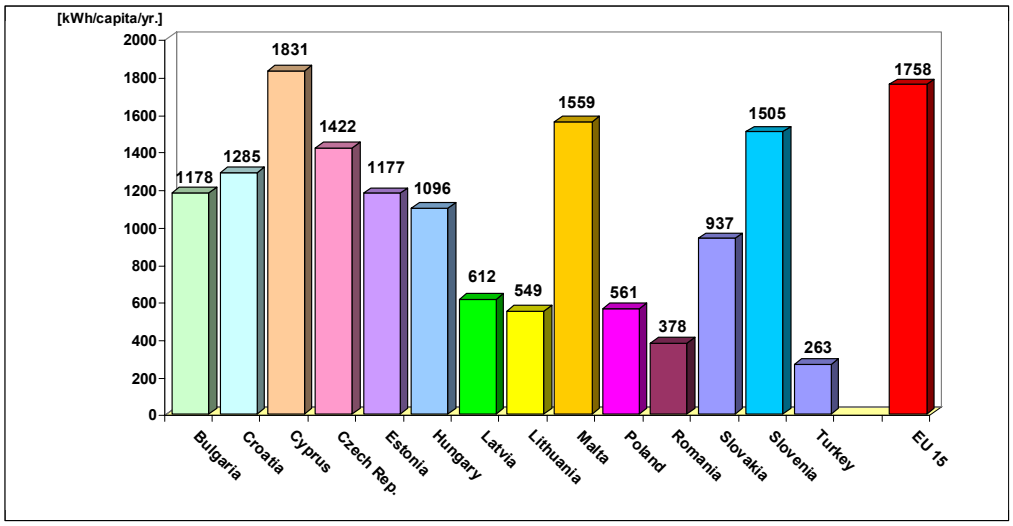

(source JRC)

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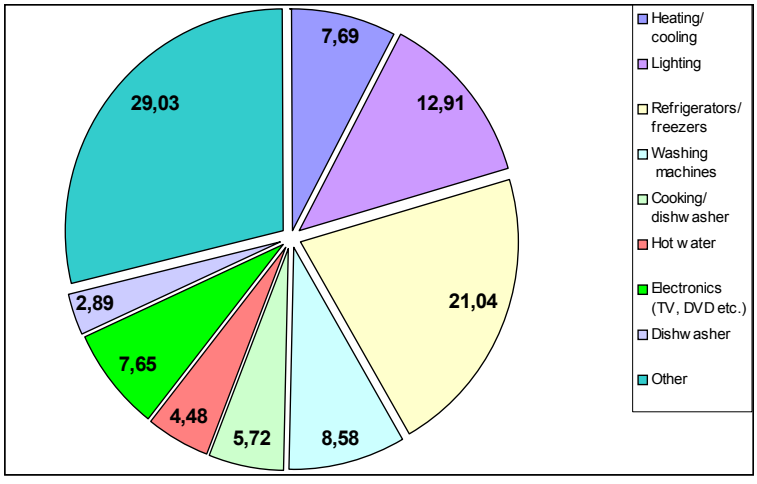
RESIDENTIAL – CONSUMPTION (3)

Joint Research Centre

Appliances and lighting take the main share of electricity consumption in households and all the electricity end-use efficiency actions in residential sector have to be oriented on these.



(source JRC)

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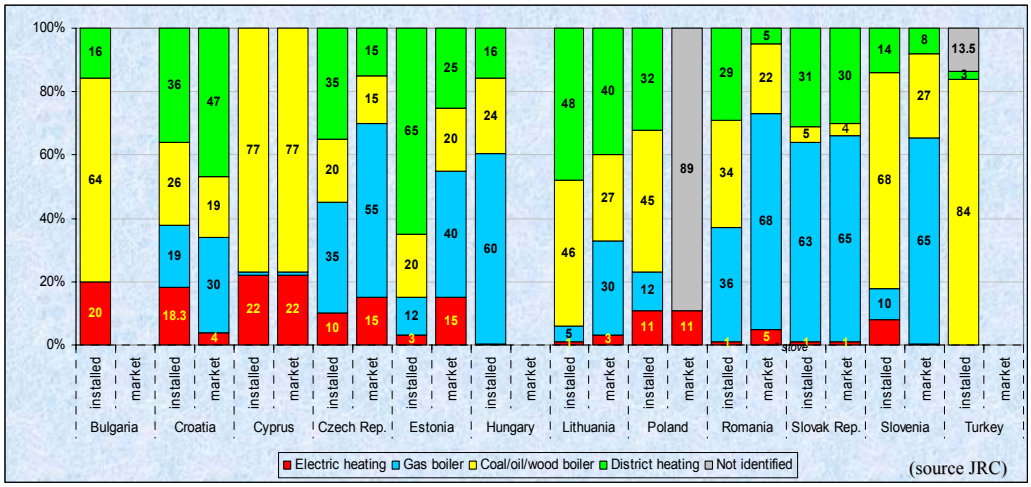
RESIDENTIAL – HEATING

Joint Research Centre

Electricity is not so used for heating in households from NMS and CC, more significant shares being in Bulgaria, Croatia, Cyprus, Czech Republic and Poland (more than 10%)



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RESIDENTIAL – HEATING: Measures

Joint Research Centre

- **Electricity saving potential that could be achieved by equipment replacement** is around **20%** but could be greater if the thermal insulation of the buildings will be improved and less electricity will be consumed to heat the same volume.

- Almost all the countries had adopted into National Legislation the 2002/91/EC Directive on the energy performance of buildings and few measures were already taken:
  - Projects at national and EU level,
  - Secondary legislation for improve the thermal insulation of buildings (including old window replacement).

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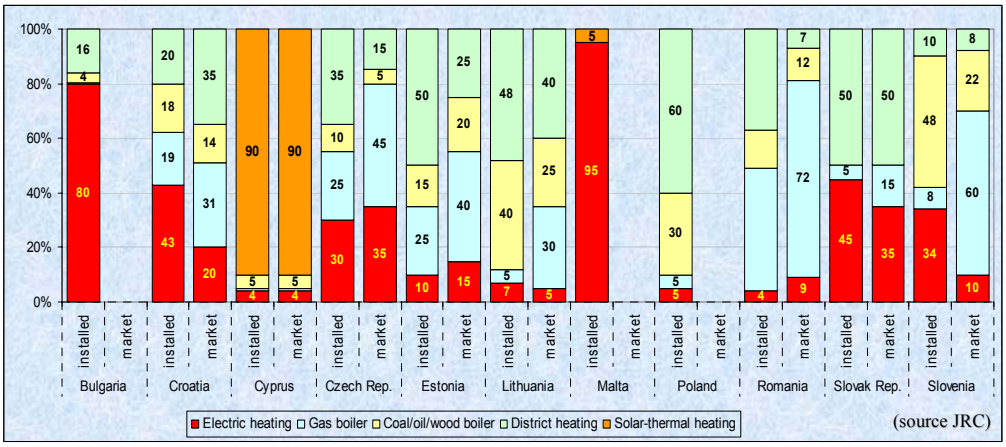
RESIDENTIAL – WATER HEATING (1)

Joint Research Centre

Electricity is used for domestic hot water production more than for heating. In Malta 95% of hot water from households are produced using electricity, 80% in Bulgaria, 45% in Slovak republic, 43% in Croatia, 34% in Slovenia, 30% in Czech Republic. **Cyprus: around 90% solar heaters!**



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RESIDENTIAL – WATER HEATING (2)

Joint Research Centre

BULGARIA:

Electrical water heating represent 80% of the installed systems, mostly being old and less efficient. By a replacement of the old equipments with new ones more efficient (20%-40% more efficient) could be achieved 0,7-1,5 % reduction in final electricity consumption in Bulgaria. *PEAK LOAD PROBLEM:* One million households switching on a heater around the same time would drive up to a peak demand around 2000 MW!

MALTA:

Hot water is produced in household almost only from electricity even conditions (weather, resources) are similar as in Cyprus, when solar water heaters mean around 80% of the installed systems.

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RESIDENTIAL – WATER HEATING: Solutions

Joint Research Centre

- increase district hot water distribution. Co-generation is a subject to be studied.
- replace the old existing hot water systems with new ones more efficient. Gas, still electricity or other fuel is another subject to be considered (specific for Bulgaria).
- increase the use of solar water heaters where the weather conditions are appropriate.

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RESIDENTIAL – LIGHTING

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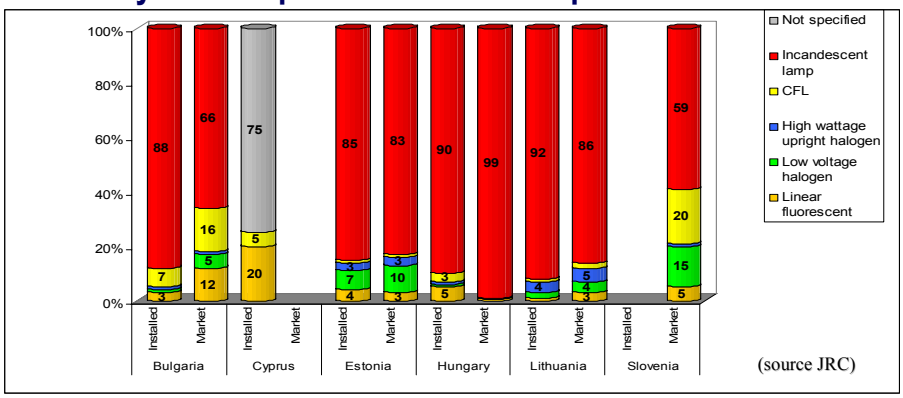
- Information relatively poor
- Taking into account that the share of incandescent lamps penetration in households is more than 70% in almost all NMS, CC and WB it is possible to say that the theoretical electricity saving potential is around 7,5 % from overall household electricity consumption but could be up to 10%



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RESIDENTIAL – APPLIANCES

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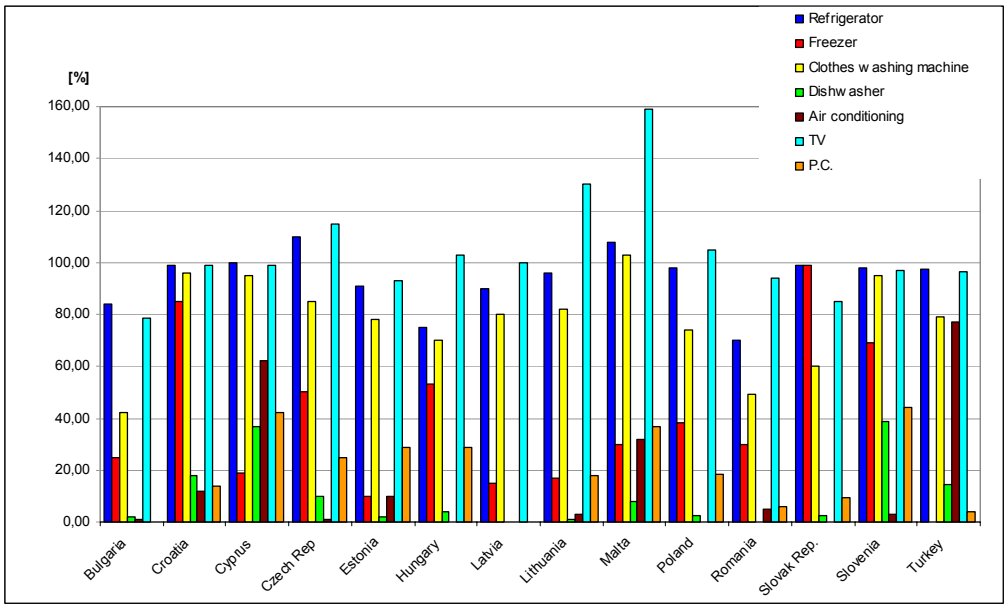

(source JRC)

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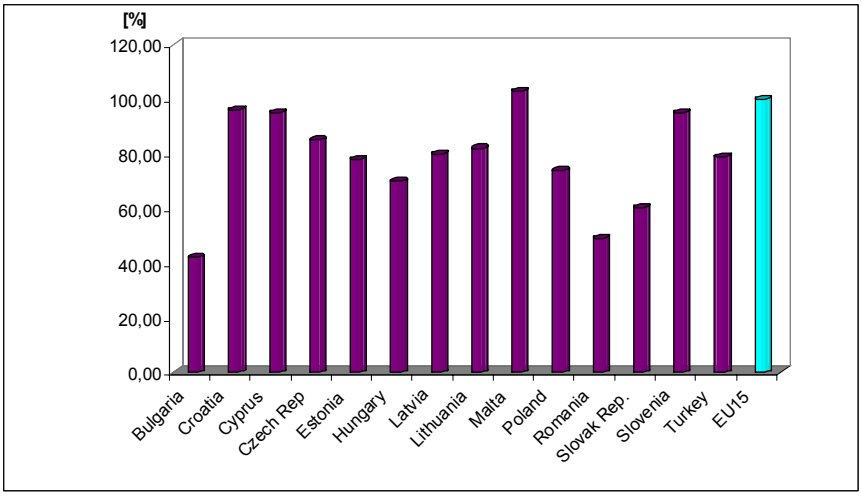
RESIDENTIAL – WASHING MACHINES

Joint Research Centre

Washing machines penetration in households from NMS and CC is closer to the average of EU - 15



(source JRC)

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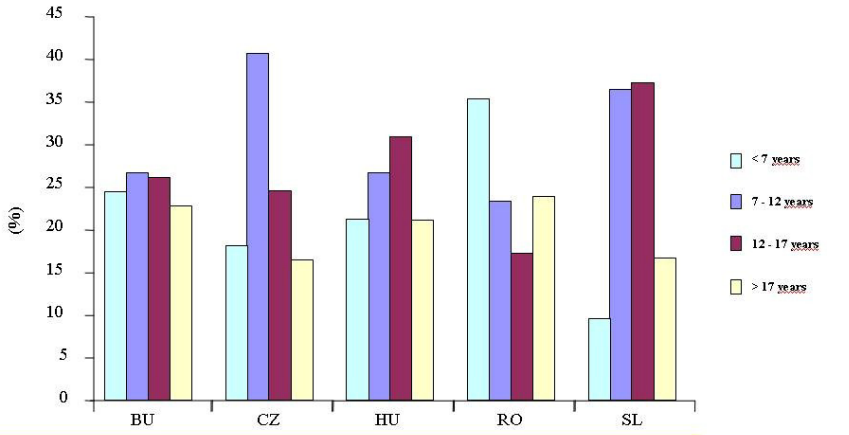
RESIDENTIAL – WASHING MACHINES (2)

Joint Research Centre

Close to 50% percent of the installed stock of washing machines is older than 12 years, comparing with only 25% in EU-15 and that means a great electricity saving potential.



	BU	CZ	HU	RO	SL
>12 years old	49%	41%	52%	41%	54%
EU15 average			25%		

(source CECED)

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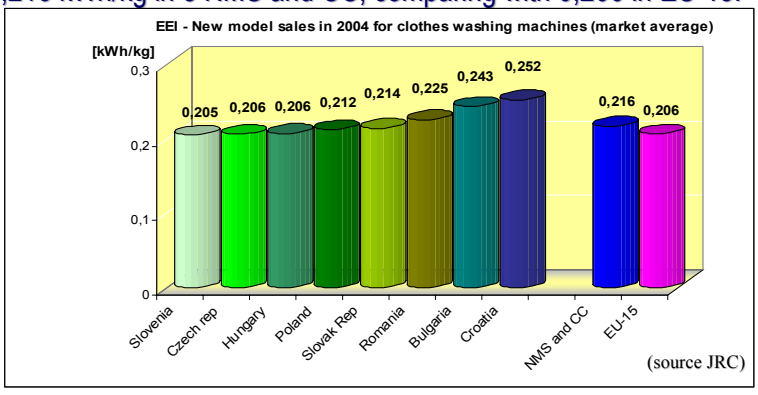
RESIDENTIAL – WASHING MACHINES (3)

Joint Research Centre

Energy efficiency is much lower in NMS and CC and the potential electricity saving only by renewing the existing old washing machines is more than 25% from the actual consumption which represents around 7% less electricity consumption in households.

PROMISING: For washing machines sales the energy efficiency index (EEI) in 2004 was around 0,216 kWh/kg in 8 NMS and CC, comparing with 0,206 in EU-15.



(source JRC)

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RESIDENTIAL – WASHING MACHINES (4)

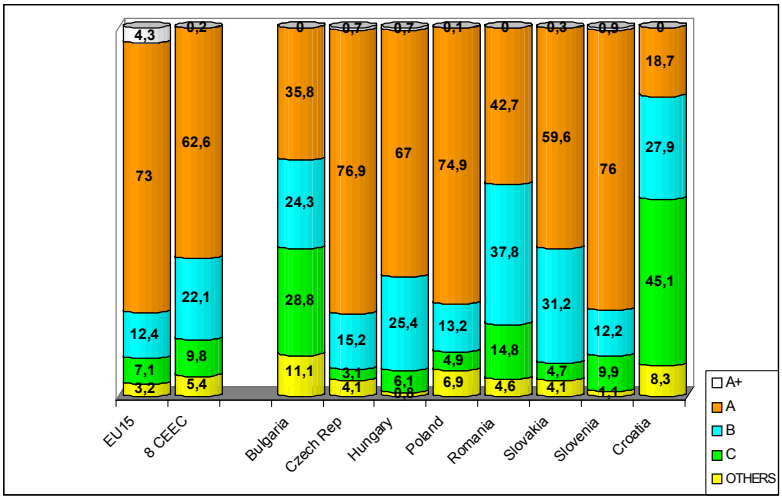
Joint Research Centre

Cumulative sales of A and B classes are around 85% in NMS, CC and in EU-15 too. Difference: a lower market penetration of A+ class and a lower percentage of A class sales in NMS and CC.

- The highest figures of A class sales: in Poland, Czech Republic and Malta.

- The lowest for A class sales are in CC: Croatia, Bulgaria and Romania.

(source GfK)



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RESIDENTIAL – REFRIGERATORS

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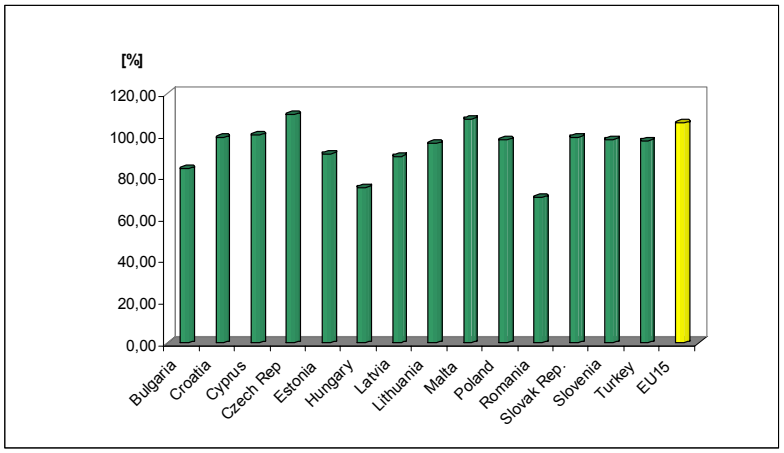
For refrigerators is the same situation as in the case of clothes washing machines: the penetration rate is quite similar as in EU-15



(source JRC)

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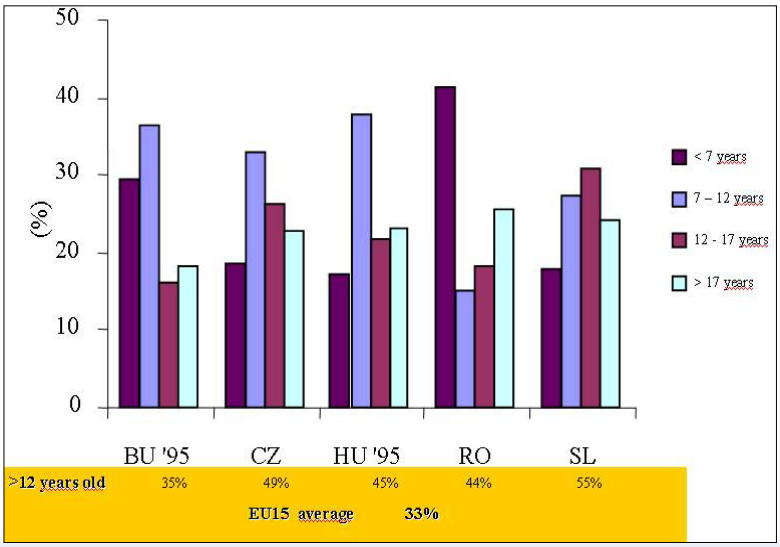
RESIDENTIAL – REFRIGERATORS (2)

Joint Research Centre

- The share of installed stock above 12 years is lower than in the previous case: 45% comparing with only 33%.



(source CECED)

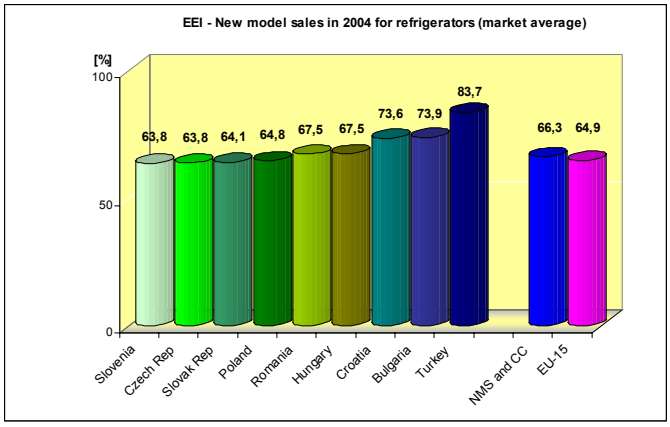
EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

RESIDENTIAL – REFRIGERATORS (3)

Joint Research Centre

The potential electricity saving only by renewing the old refrigerators represents around 6% less electricity consumption in households.

PROMISING: In 2004, the energy efficiency index for refrigerators sold in 9 NMS and CC was much closer than in other previous years to the one from EU-15.



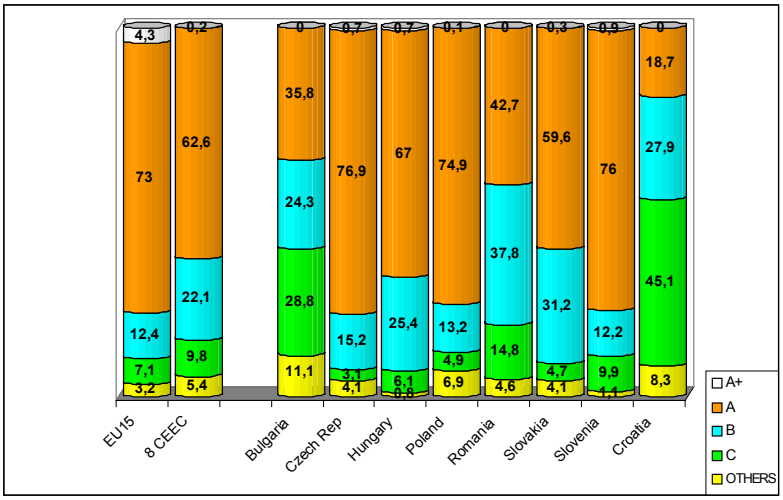
(source JRC)

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

RESIDENTIAL – REFRIGERATORS (4)

Joint Research Centre

Cumulative sales of the most energy efficient classes, A and B, are higher on markets from NMS and CC than in EU-15



(source GfK)

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RESIDENTIAL SECTOR – GENERAL CONSIDERATIONS

Joint Research Centre

- in almost all the countries the average income is much lower than in EU15;
- the prices for electricity are not at EU15 level;
- the penetration of appliances in households is lower than in EU15 but growing; the distribution of appliances among classes is different – higher share of less efficient appliances;
- if no electricity saving measures are implemented, consumption will reach EU-15 levels in the near future; look at Slovenia, Cyprus and Malta figures! Bulgaria not typical!

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TERTIARY SECTOR

Joint Research Centre

- Breakdown of electricity use according to major types of equipments
- Not all equipments are covered in breakdowns
  - Lighting, PC's and air-conditioning/heating are most important regarding electricity consumption
  - There is a potential to improve the efficiency of lighting equipment? How great is?

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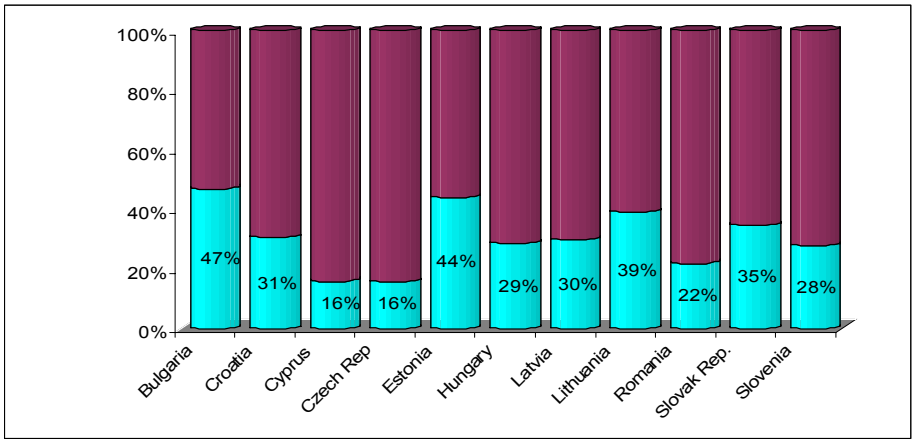
DIRECTORATE-GENERAL
Joint Research Centre

TERTIARY SECTOR

Joint Research Centre

Tertiary sector is the most delicate one regarding availability of data.

From some NMS and CC is a great lack of data and specific measures to improve the knowledge about electricity consumption must to be taken, both at national and EU level.



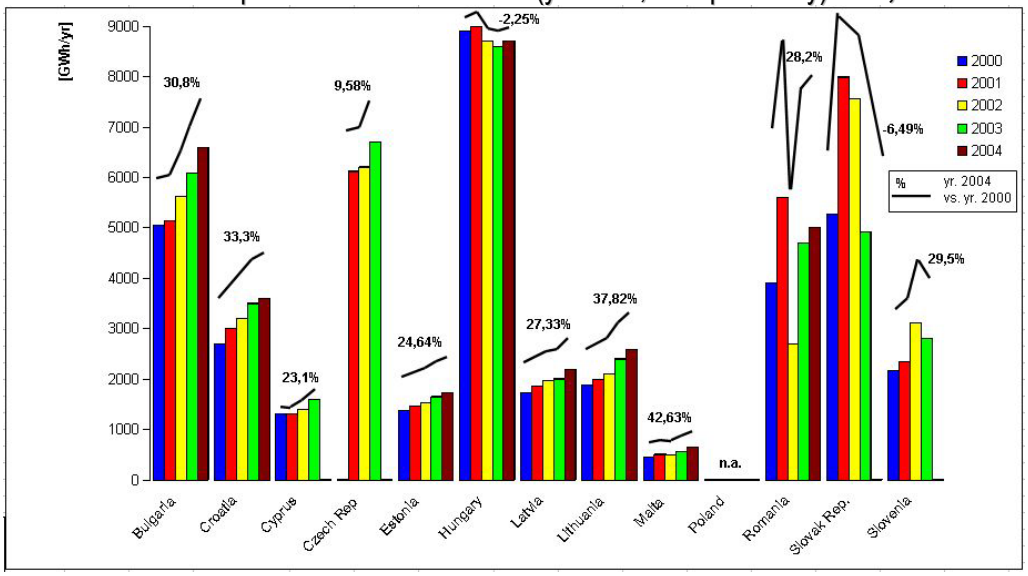
Share of electricity consumption in final energy consumption in tertiary [2003] (source JRC)

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

TERTIARY SECTOR - CONSUMPTION

Joint Research Centre

Cumulated consumption in New MS and CC (yr. 2003, except Turkey) = **66,53 TWh**



(source JRC)

EUROPEAN COMMISSION
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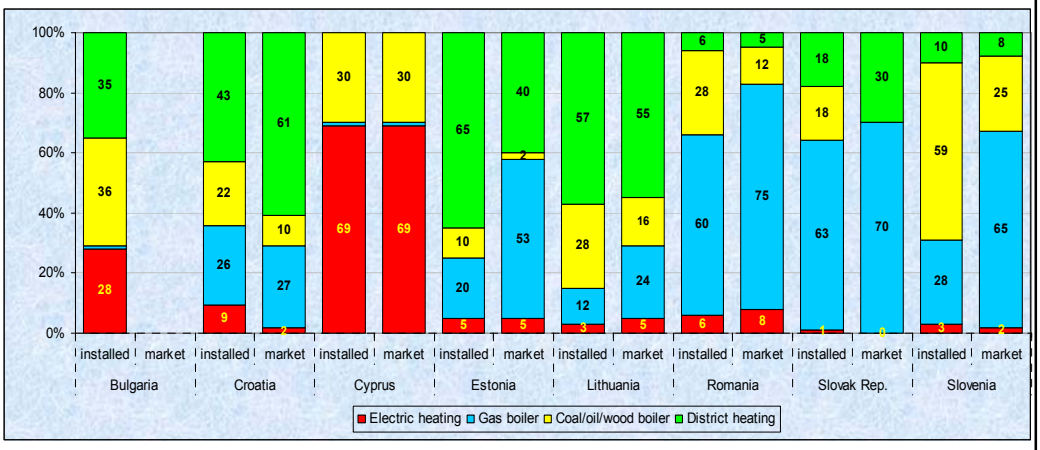
Joint Research Centre

TERTIARY SECTOR - HEATING

Joint Research Centre

- Status: better in tertiary than in residential sector (new sector which started to develop in CEEC at the beginning of '90 and the equipments age are lower than in residential) BUT 10% reduction of electricity consumption for heating could be achieved.



(source JRC)

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

TERTIARY SECTOR – LIGHTING

Joint Research Centre

Lamps and ballasts

Information about lighting in tertiary sector appears to be scarce, even estimations, and only from few countries it was possible to obtain it .

		T12	T8	T5	CFL	Incandescent Lamp
Bulgaria	Installed [%]	5	70	5	5	15
	Market [%]	2	66	6	10	16
Lithuania	Installed [%]	40	15	n.a.	5	40
	Market [%]	30	40	n.a.	10	20
Poland	Installed [%]	74	n.a.	n.a.	2	24
	Market [%]	n.a.	n.a.	n.a.	n.a.	n.a.

Share of sales and installed lamps in some NMS and CC (source JRC)

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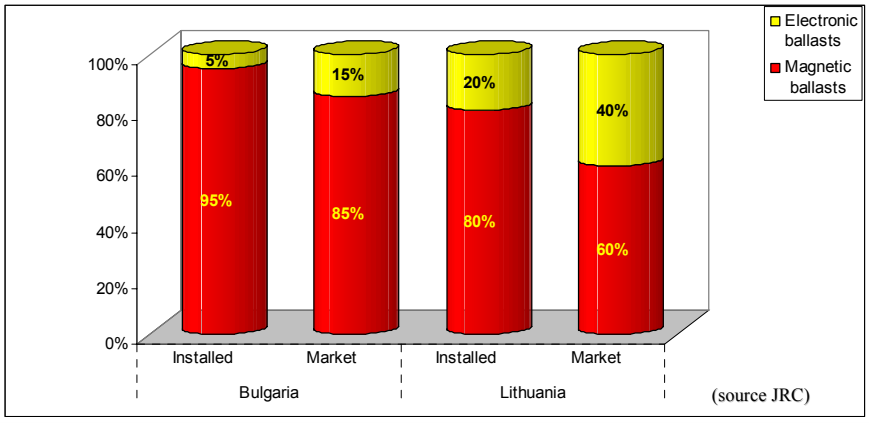
Joint Research Centre

TERTIARY SECTOR – LIGHTING (2)

Joint Research Centre

More than 15% of the actual electricity consumption for lighting in tertiary could be saved by replacing the magnetic ballasts with electronic ones.

The price difference between electronic and magnetic ballasts is the main barrier for widespread penetration of the first ones.



EUROPEAN COMMISSION
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Joint Research Centre

TERTIARY SECTOR – Few Considerations (1)

Joint Research Centre

A greater attention must to be paid to public buildings as hospitals, schools, administrative buildings which are heated using electricity but with older equipments.

Electrical heating in tertiary sector from NMS and CC is especially used in a higher share in Cyprus and Bulgaria:

- electricity savings taking into account specific measures for changing the old equipments with new ones more efficient or, if it is more sustainable, to encourage market penetration of technology based on other fuels.

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Joint Research Centre

TERTIARY SECTOR – Few Considerations (2)

Joint Research Centre

- Great potential for electricity saving is concentrated mainly in public buildings and is likely to be linked to the renovation process
- The installed HVAC equipment and sales are still dominated by high energy consumption models – also good potential for electricity saving
- Also a good potential: the installed lighting equipment (lamps and ballasts)

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

CONCLUSIONS (1)

Joint Research Centre

- The electricity end-use in buildings from NMS ad CC has a great potential of savings by renewing the existing aged appliances, by replacing of the existing light equipment with more efficient ones and by changing/improving the electrical heating systems.
- Similar to the situation in EU-15, residential and tertiary sectors from NMS and CC account around 50% of total electricity consumption in NMS, CC and WB. A great electricity savings potential therefore waits to be harvested.
- Numerous energy efficiency EU and national programmes have been developed in NMS and CC, mainly as a result of the transposition of EU legislation; now the evaluation of the actual energy savings achieved and actual potentials in a more systematic manner is needed: by sectors, how much electricity, how much thermal energy, what's the contribution of renewable energy.

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

CONCLUSIONS (2)

Joint Research Centre

- The economic growth in NMS and CC is faster than in EU-15, so the electricity consumption has a rate of increase at a higher percent and now is the moment to act to foster energy saving measures in these sectors with multiple benefits: increase electricity end-use efficiency, increase the quality of life even with the electricity price rises, reach the EU targets and avoid the construction of new power generation capacities.
- Restructuring the energy sector, particularly the bringing the demand side to the restructured and liberalised markets, is a major part of the sustainable development concept of EU. We need energy but the way it is used must be evaluated in order to break the link between economic growth and increase in energy consumption and thus improve the quality of life without a proportional increase of energy consumption.

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

ACKNOWLEDGEMENTS

Joint Research Centre

Most of the figures from this report are based on data provided by professional and kindly cooperation of National Statistic Institutes from New MS and CC, of Ms. Matilde Soregaroli - GfK, of Mr. Luigi Meli - CECED, and of National experts from NMS and CC: Ms. Biliana CHOBANOVA, Mr. Kolio KOLEV, Mr. Lulin RADULOV, Mr. Josef BUBENIK, Mr. Jaroslav MAROUSEK, Mr. Jaan TEPP, Mr. Raimo OINUS, Teet-Andrus KÕIV, Mr. Laszlo ELEK, Ms. Diana URGE-VORSATZ, Mr. Didzis CINOVSKIS, Ms. Dagnija BLUMBERGA, Mr. Evaldas PIESLIAKAS, Mr. Romualdas SKEMA, Mr. Robert GHIRLANDO, Mr. Mario FSADNI, Mr. Adam GULA, Mr. Roman BABUT, Mr. Constantinos XICHILOS, Mr. Kypros PAPHITIS, Mr. Corneliu ROTARU, Ms. Cristiana CALUGAR, Mr. Cristian TANTAREANU, Mr. Marian HUSARIK, Mr. Stane MERSE, Mr M.K.BUYUKMIHCI, Mr. Mehmet ÇAĞLAR, Ms. Vesna KOLEGA.

MINISTRY OF ENERGY AND ENERGY RESOURCES

ENERGY EFFICIENCY AGENCY

ENERGY EFFICIENCY POLTENTIAL IN BUILDINGS

BULGARIA

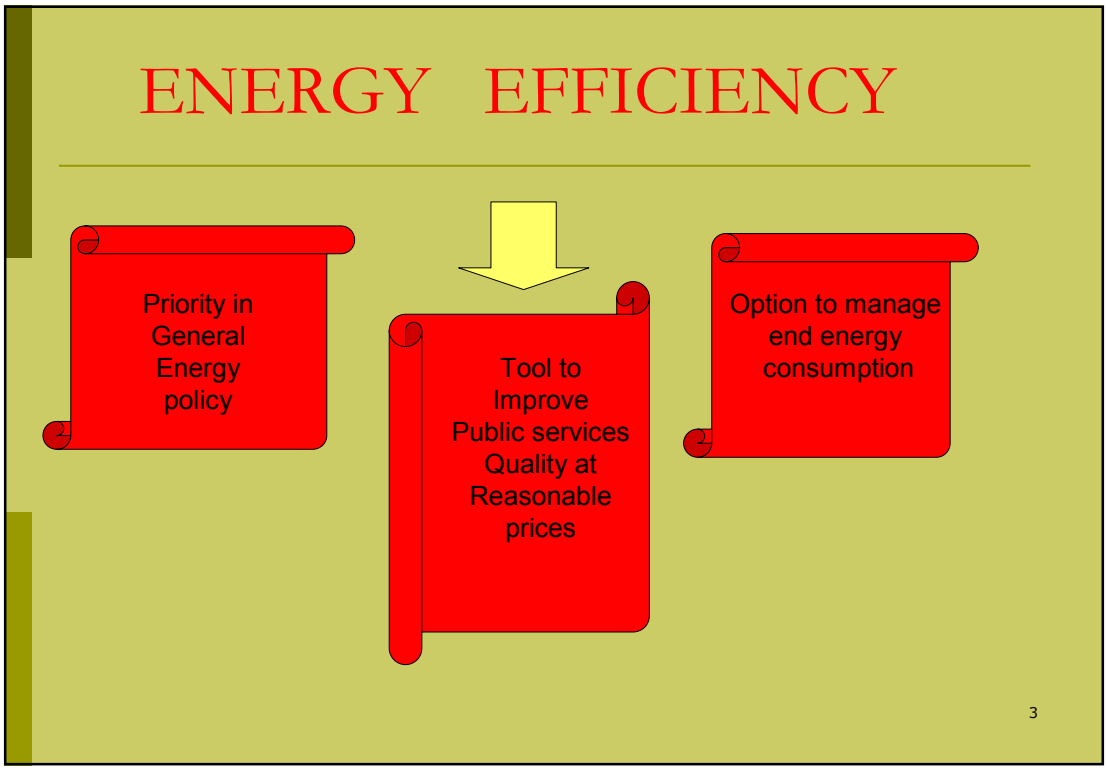
Tallinn , 6 – 8 July 2005

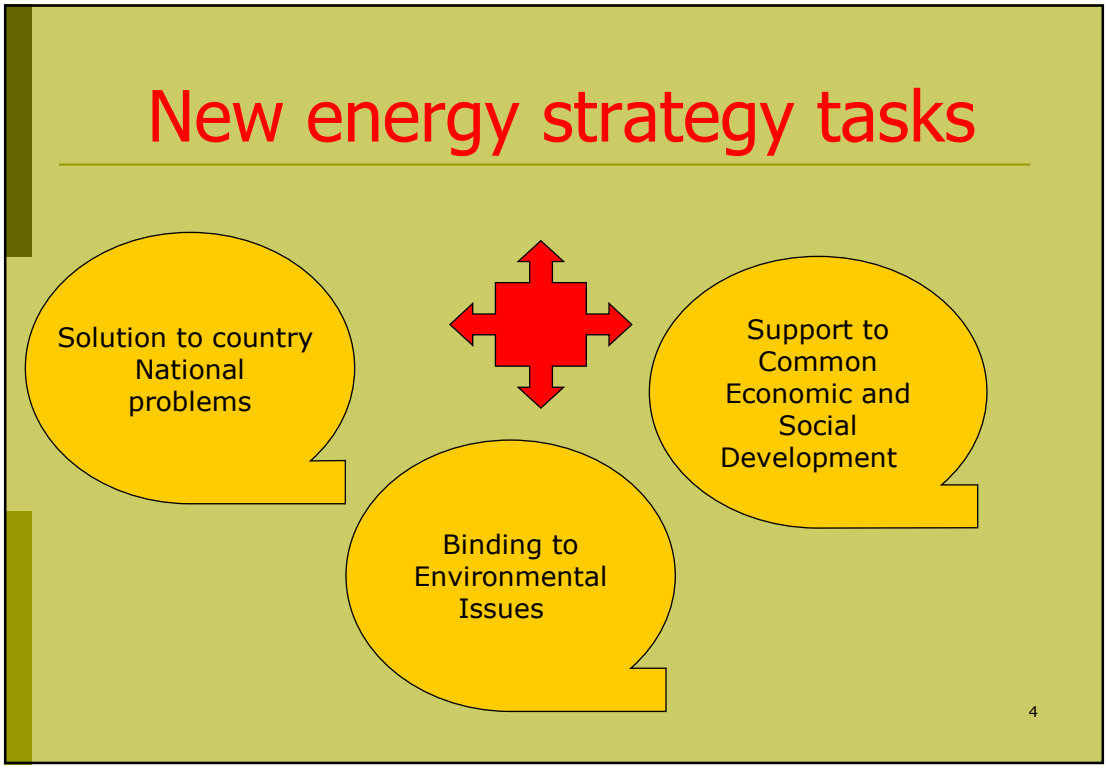
1

ENERGY EFFICIENCY POLICY

- The policy on EE and RES in Bulgaria is conducted by the Minister of energy and energy resources.
- The Energy Efficiency Agency of Bulgaria (EEA) is an executive agency to the Minister of energy and energy resources and is financed by the state budget.
- The EEA has a staff of 51 employees

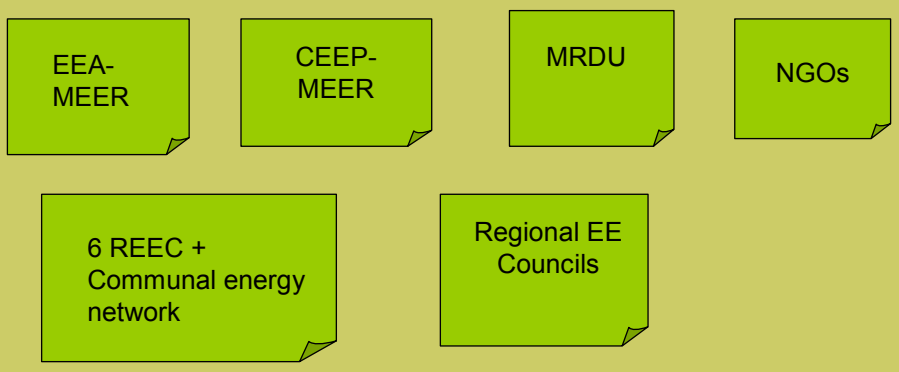
2


ENERGY EFFICIENCY
Priority in General Energy policy
Tool to Improve Public services Quality at Reasonable prices
Option to manage end energy consumption
3


New energy strategy tasks
Solution to country National problems
Support to Common Economic and Social Development
Binding to Environmental Issues
4

Energy Efficiency Policy

- Institutional framework



5

Activities for overcoming existing barriers and implementation of energy saving policy:

- Training and awareness of energy consumers via informational campaigns;
- Elaboration of legal and normative base for energy saving in all economic sectors, plus tertiary sector;
- Pointing out of tools for financing EE measures;
- Elaboration of finance conditions, stimulating use of EE **electric appliances and devices** ;
- Elaboration of programs for social security of consumers;
- Establishment of Building owner associations ;
- Consultations to the society on EE issues;

6

Activities for overcoming existing barriers and implementation of energy saving policy

- Improving EE in implementation process of combined heat and power generation and reduction of energy losses;
- Better energy efficiency in all economic sectors , especially in building sector ;
- Promotion of investments in EE measures at end users;
- Support to projects and programmes with considerable social effect ;
- Supporting the development of more economic ways for heating, compared to these one of electric energy and improving the public access to them;
- Building up of effective systems for gasification or heating;

7

The EEA has elaborated two Draft long term programmes with national importance:

- National Energy Saving Programme (NESP) up to 2015
- National Programme for the Use of RES (NPRES) up to 2015

National Energy Saving Programme 2005-2015

- NESP contains a pool of mechanisms and measures for the realization of effective policy for improvement of energy efficiency through its integration in the compact national policy for social and economic development.
- The execution of the NESP till 2015 will stabilize the Bulgarian economy. The 100% implementation of the Programme will lead to about 30% reduction of energy intensity of GDP.

National energy saving program 2005-2015 - approximately

Investments	Saved fuels	Saved electric conventional energy	Saved thermal conventional energy
2410 MEURO	804 ktoe/year	3 134 040 MWhe/year	3 871 357 MWht/year

Annual economic effect	SAVED EMISSIONS
492,5 MEURO	5 594 kt/year

Three years energy saving action plan 2005-2007 - approximately

Investments	Saved fuels	Saved el.energy	Saved thermal energy
119 MlnLv	63,84 Ktoe/year	221 426 MWh/year	553 851 MWh/year

Annual economic effect	Saved emissions
66,8 MlnLv	419 kt/year

11

Three years action plan for energy saving potential – building stock 2005-2007 - approximately

investments	Saved fuels	Saved el.energy	Saved thermal energy
126,5 MlnLv	1.03 Ktoe/year	125 705 Mwh/year	466 680 Mwh/year

Annual economic effect	Saved emissions
38 670 Mln Lv	223,8 KT/year

12

Three years action plan for energy saving – building stock 2005-2007

- ***Technical programs:***
- **Program for energy saving measures in panel buildings**
- **Program for energy saving in commercial and public buildings**
- **Program for energy saving in monolite buildings**
- ***Non technical programs:***
- **Training and preparation on energy saving**
- **Energy bench – marking of buildings**

13

EE Potential in Building Sector

The Building sector end energy consumption share is about 40 %.
Over the half of this share contain 2,125,250 homes .
In the country there are :

- ***120 house panel building complexes with***
- ***18,900 panel blocks and***
- ***800,000 apartments***
- ***2,200,000 people live in these buildings (BG has 8,000,000 people)***
- ***Project FRAMES under EU proggramme SAVE II has been completed in 2004 . It concern renovation of multi-family panel buildings built after the Second World War.***
- ***30 % expected energy savings – isolation , new energy technologies , household appliances***

The EE measures in buildings can be combined with RES , mainly solar thermal systems .

14

ENERGY EFFICIENCY LAW

This new EE Law is based on the EU energy efficiency acts including Directive 2002/91/EC on the energy characteristics of buildings as well as the Energy Charter Agreement (A protocol concerning energy efficiency and related environmental aspects attached to the Energy Charter Agreement), the Kyoto Protocol, etc.

Energy Efficiency Law

- **Part of total policy to reduce energy expenses at end users;**
- **Establishment of EE Fund – the end-users may apply for financing EE projects from this fund;**
- **The fund foresees tax exemptions (Buildings with refitted isolation and heating system will be exempted per once from building tax for a period from 5 to 10 years after the energy audit and certification of the building).**

16

Energy Efficiency Law

The Low provide conditions for the reduction of GDP energy intensity , rational use of energy , EE financing , reduction the harmful environmental impact and improvement the civil energy services .

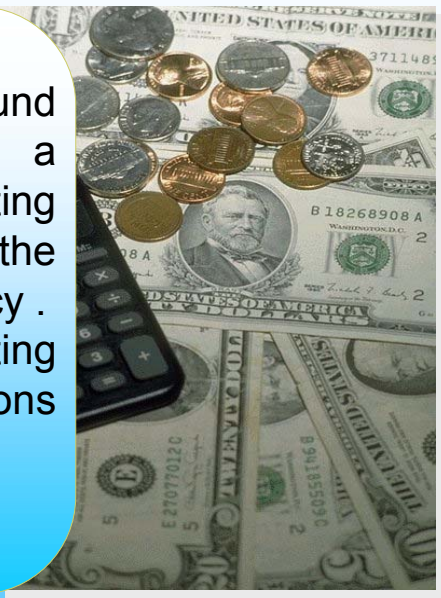
There are 4 Regulations in force under the Low , supporting this conditions :

- **Regulation for energy performance in buildings**
- **Regulation for energy efficiency auditing**
- **Regulation for certification of buildings**
- **Regulation for establishment and maintenance of public register of the experts carrying out the building certification and/or energy audits**

17

Energy Efficiency Fund

Bulgarian Energy Efficiency fund has been established as a revolving tool for attracting financial resources to promote the development of energy efficiency . It is an important step supporting the efforts to reduce the emissions of greenhouse gases.



Energy Efficiency Fund

The Fund provide :

- Low interest Loans for investment project in the public and private sectors
- Guarantee

Energy Efficiency Fund

The Fund capital is $ 17 million :

- $10 mln by GEF – WB
- $1,5 mln by BG Government
- $ 5,5 mln by other donors
- Fund Manager assigned – starting period

KIDSF – Kozlodui Fund

Decommissioning 4 units in NPP Kozlodui

- Steering Committee in MEER

The Fund shall :

- provide 100%grant for EE projects in public buildings , hospitals, schools
- 5 MEUR – first transfer
- 36 EE Projects started – hospitals, schools, cultural institutions

Credit Line

- 60 MEUR - Capital

- 50 MEUR from EBRD - Loan
- 10 MEUR from KIDSF - GRANT
- provide 20% grant for EE projects in buildings
- provide 7,5 % grant for RES projects
- 6 Bulgarian Banks manage credit line
- 11,5 MEUR are used for 25 EE Projects up to now

ENERGY SERVICES

- Energy auditing – over 3,000 Mwh/year , 418 enterprises
- Energy certification – state and municipal buildings over 1,000 sq.m
- Performance contracting
- TPF

thank you for the attention

Kolio Kolev – director in EEA

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37, Ekzarh Yossiff

E-mail: KKolev@SEEA.government.bg

24

International workshop:

"Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries"

Tallinn, 6-8 July 2005

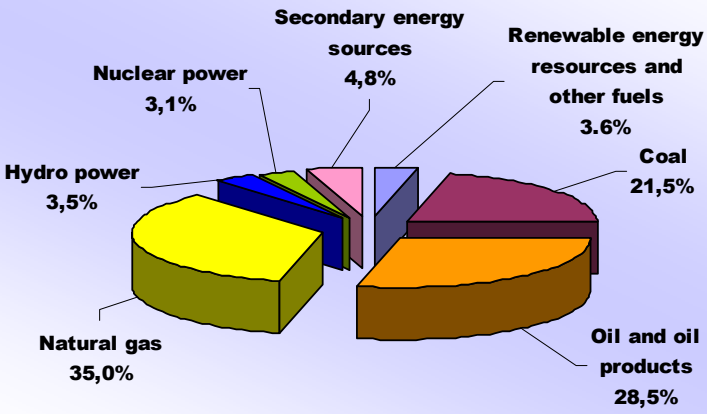
ROMANIA:

Status of final electricity use in tertiary and residential sectors

1

General Data

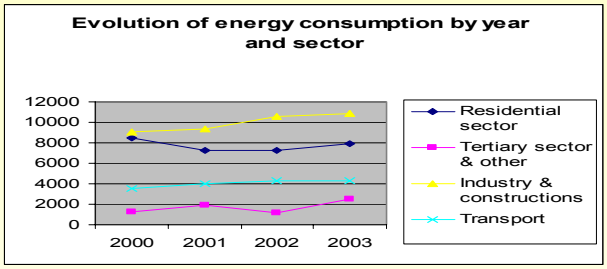
Population: 21 733 556 in July 2003
Area: 237 500 sqKm
GDP: 2 322 Euro/capita



Structure of Primary Energy Consumption

2

GENERAL DATA REGARDING THE ENERGY CONSUMPTION [thtoe /TWh]



The share of tertiary sector energy consumption in the total energy consumption [%]: 9.7 (2003)

	2000	2001	2002	2003	2004 (estimation)
Residential sector	8433 98.05	7197 83.68	7282 84.67	7879 91.61	n.a
Tertiary sector & other	1207 14.03	1915 22.26	1159 13.47	2440 28.37	n.a
Industry & constructions	9017 104.84	9351 108.73	10616 123.44	10892 126.65	n.a
Transport	3508 40.79	3975 46.22	4319 50.22	4319 50.22	n.a
TOTAL	22165 257.73	22438 260.90	23376 271.81	25153 292.47	n.a

3

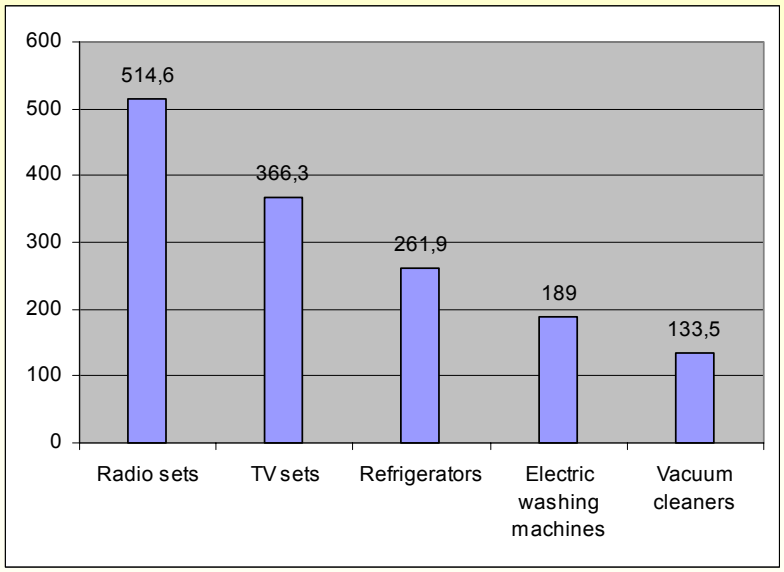
GENERAL DATA REGARDING THE ELECTRICITY CONSUMPTION [thtoe /TWh]

The share of electricity consumption in the total energy consumption for tertiary sector [%]: 16.5 (2003)

	2000	2001	2002	2003	2004 (estimation)
Residential sector	662.2 7.7	662.2 7.7	670.8 7.8	705.2 8.2	679.4 7.9
Tertiary sector	309.6 3.9	481.6 5.6	232.2 2.7	404.2 4.7	
Industry	1711.4 19.9	1788.8 20.8	1952.2 22.7	1909.2 22.2	2700.4 31.4
Transport	163.4 1.9	154.8 1.8	172 2.0	154.8 1.8	
TOTAL	2915.4 33.9	3121.8 36.3	3061.6 35.6	3225 37.5	3491.6 40.6

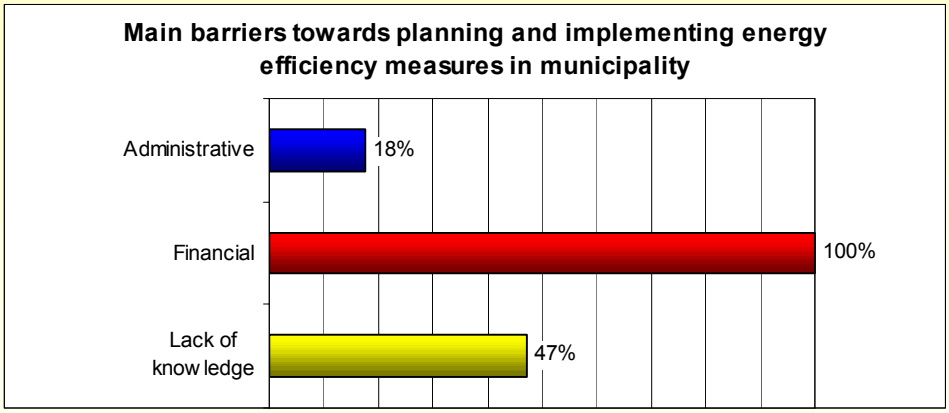
4

LEVEL OF THE APPLIANCES PENETRATION IN HOUSEHOLDS- 2003



according the Statistical Yearbook

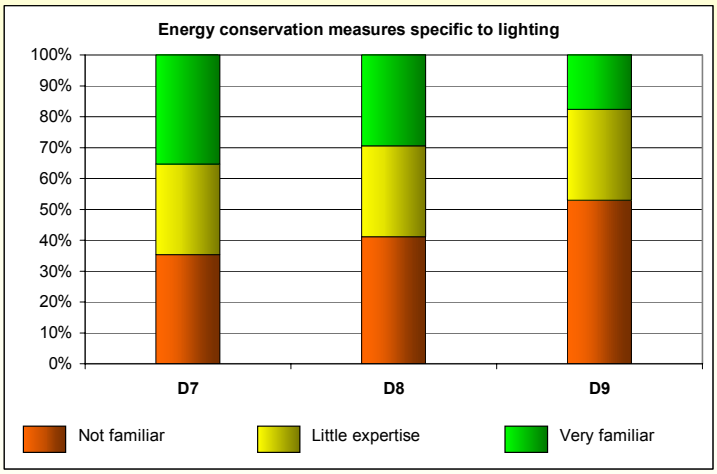
Questionnaire to municipalities covering 1600000 inhabitants (1)



Questionnaire to municipalities (2)

Questions:

D7. Energy-efficient lamps, fixtures and ballasts
D8. Day-lighting controls
D9. Occupancy sensors



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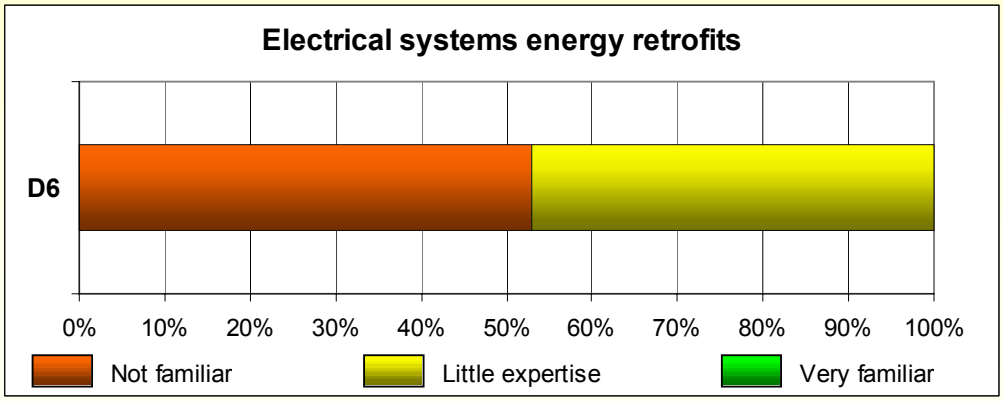
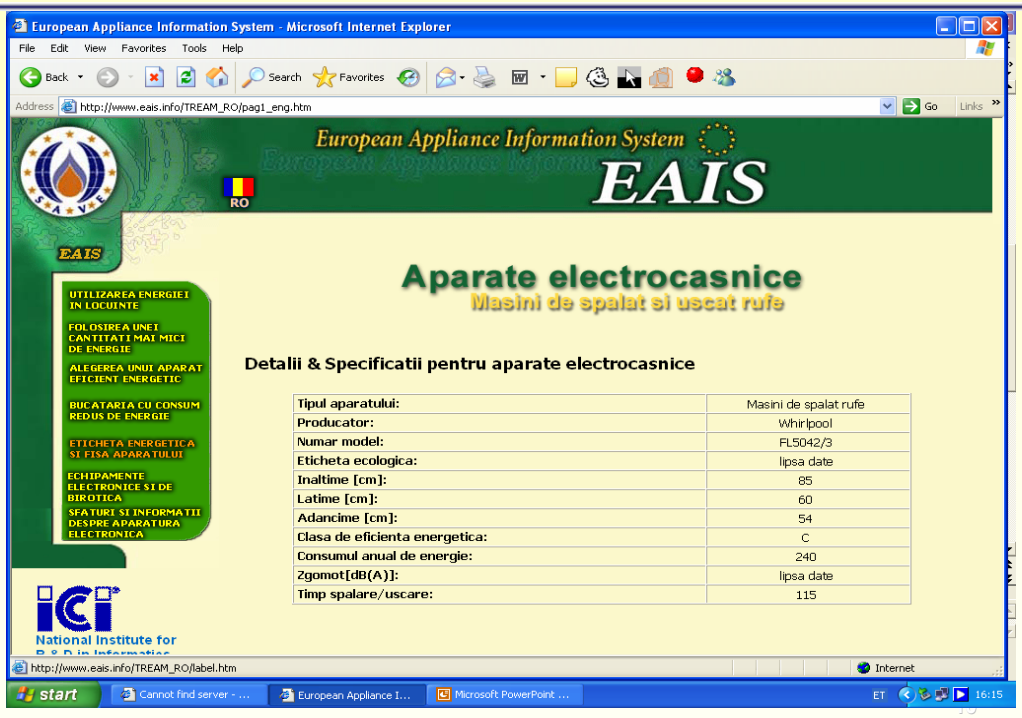
Questionnaire to municipalities (3)

Question:
Importance of various electrical systems in total building energy use



8

The EAIS European Appliance Information System website- used in Romania www.eais.info



2004 confirmed the previous trends on:

- increase of total energy consumption: about 6%
- increase of total electrical power consumption
- (still) slow decrease of global energy intensity
- GDP increase: by 7.5%
- high energy intensity - especially due to the structure of the national economy
- clear increase of dependency of the imported energy resources

  28% - 2002;
  34% - 2003;
  47% - 2010 expected;

- intensified increase of energy prices

Today (July 2005) residential energy prices are (including VAT 19%):

Natural gas:	230 Euro/1000 m3
Electricity:	119 Euro/MWh
District heating :	28 Euro/Gcal

2004 confirmed the previous trends on:

- increasing level of the appliances penetration in households
- in households, the major concern on energy is heating: thermal insulation, individual monitoring of heat consumption etc.

  Fiscal incentive to extract from the individual income before taxes, 1500 RON spent on improving heating efficiency.
- still low interest for households electricity consumption (see the different consumers reaction on the introduction of the fixed component in the natural gas bill and in the electricity bill)
- increasing interest for modern appliances

12

13

International workshop:

"Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries"

Tallinn, 6-8 July 2005

ROMANIA:

ESCO's status

14

IMPROVED LEGISLATIVE BACKGROUND FOR ENERGY MANAGEMENT...

- Guide for Training and Examination of energy auditors, approved by President Decision no. 57 / 28.05.2003,
- Guide for Elaboration and Analyse of energy audits, approved by President Decision no. 56 / 28.05.2003,
- Procedure for monitoring of activities related to the elaboration of energy audits approved by President Decision no. 59 din 28.05.2003,
- Guide for Training and Examination of energy managers from industry, approved by President Decision no. 58 din 28.05.2003.

10 technical universities certified for training and examination

15

...with ARCE LICENSING ENERGY AUDITORS & MANAGERS...

- ***Regulation for authorizing the natural and legal persons entitled to execute energy audits***
- ***Regulation for attesting the appointed persons responsible in the energy management field***

Energy auditors licensing

➢ Business opportunity for legal / natural energy experts

Location of the Technical University Centers agreed by ARCE to organize energy specialized courses

Energy managers licensing

➢ Compulsory for the energy consumers with E > 1,000 toe/year

Diploma offered by ARCE to the authorized energy auditors & managers

16

… BUT FEW ESCOs AND APPLIED ACTIVITIES.

S. C. ENERGY-SERV S.A.
- set-up in 1996, as the first private Romanian ESCO

RIEEC (**Romanian Industrial Energy Efficiency Company)**

- set-up in 2003; initial financing - 15 million EURO of RAEF's equity and EBRD's loan

TPF Consulting – FREE Fund Manager

ECONOLER INTERNATIONAL
- technical assistance for energy service concept promotion;
- FREE technical assistance;

TOFAN Energy Service
- share holders : TOFAN Group
  Management & Energy Services

17

Conclusions on ESCO's status

- ❑ **No breakthrough in comparison to 2003 status**
- ❑ **Slow and hesitant development due mainly on legislative and financial barriers**
- ❑ **A decisive positive impact is expected with the future transposition of the Directive on energy services**

18

SESSION 3:

ENERGY SERVICES COMPANIES: STATUS AND RELATED PROJECTS

reeep renewable energy & energy efficiency partnership

Workshop on Energy Efficiency potentials in buildings, barriers and ways to finance projects in new member states and candidate countries

Tallin, 7.7.2005

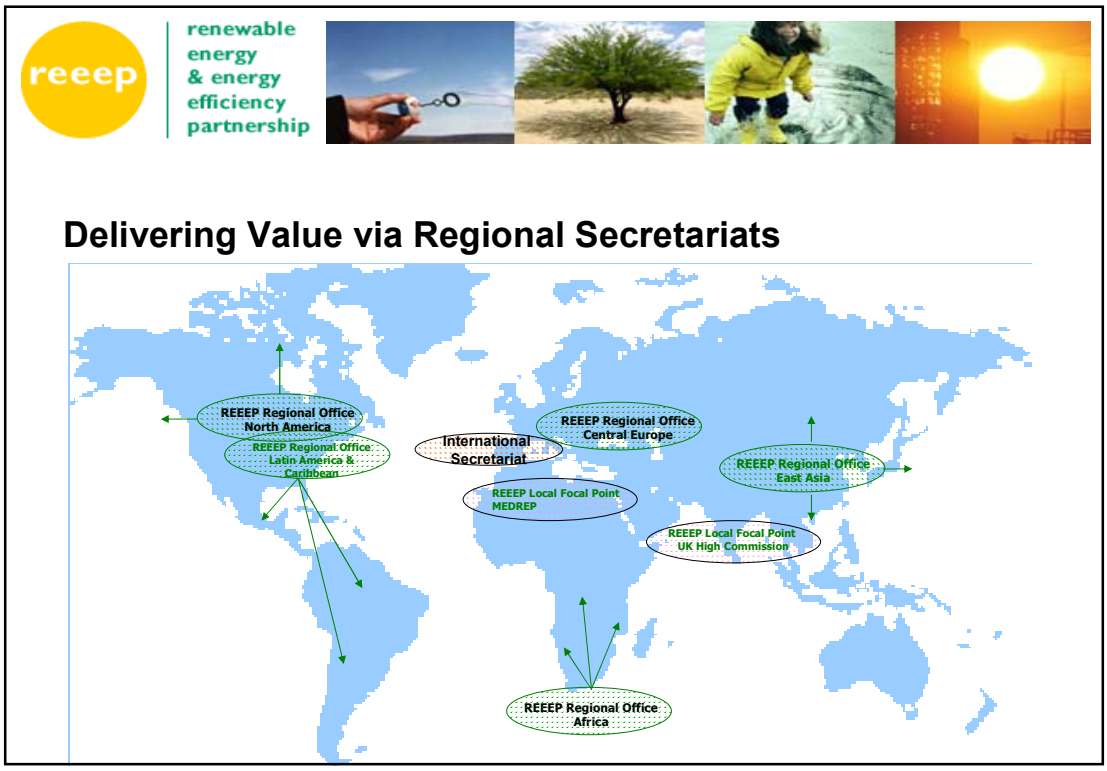
Renewable Energy and Energy Efficiency Partnership (REEEP)

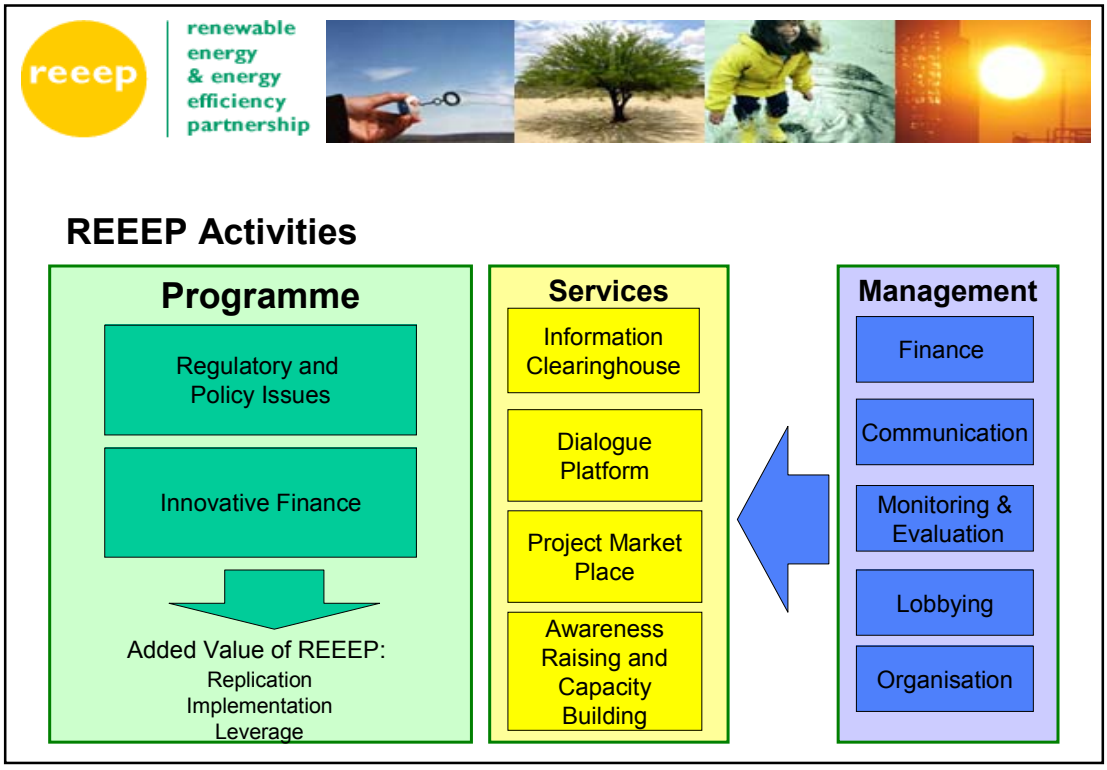
Dr. Marianne Osterkorn
REEEP International Director

reeep renewable energy & energy efficiency partnership

REEEP
– Renewable Energy and Energy Efficiency Partnership

1. REEEP is a global public private partnership launched by the UK government at the WSSD.
2. REEEP currently comprises 138 partners representing 27 governments, businesses and NGO's committed to accelerating the uptake of renewable energy and energy efficiency.
3. REEEP is currently funded by various governments such as the Austria, Australia, Canada, Germany, EU, Ireland, Italy, the Netherlands, Spain, US, and UK the major donor of REEEP.





Marianne MOSCOSO-OSTERKORN, REEP International, Austria

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REEEP Finance

Projects

National Programs are dedicated to REEEP

38 Projects financed &managed through GOF(UK)
2 projects financed through BMWA (Austria)
CALL 2005 : 18 projects, GOF financed
CALL 2005: approx 25 projects, DEFRA financed

Services

Annual Donation of Donor Countries

Project Administration Fee
(10% of the project volume)

Donations from Business and Organisations

Sell Services

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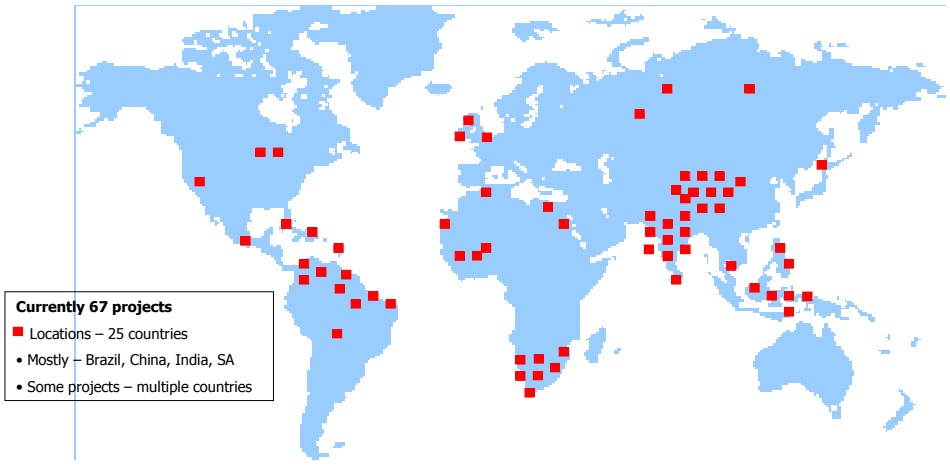
Location of REEEP Projects



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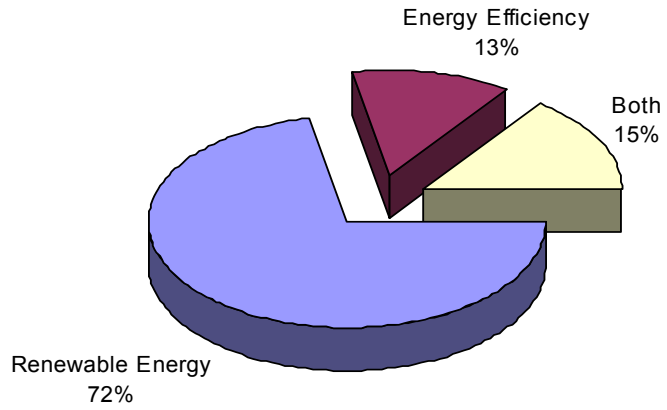
Distribution by Sector



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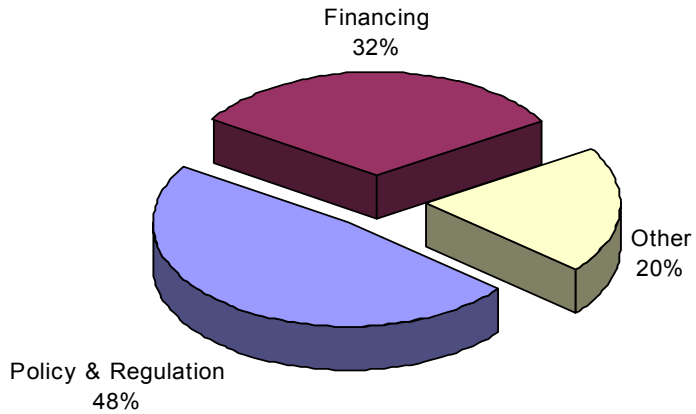
Distribution by Theme



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Business Opportunity - ESCOs

Energy Service Companies (ESCO) are a method of financing energy efficiency projects.

- Black Economic Empowerment in South Africa
- Philippine ESCO for energy efficiency upgrades in schools, hospitals, water districts & industrial parks
- Capacity building in Western China for the development of ESCOs

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Benefits of becoming a REEEP Partner

- Contacts with decision makers within partner countries
- Reduced investment risk in developing countries via policy support
- Demonstrate Corporate Social Responsibility
- Increased project credibility
- Easy access to innovative finance
- Marketing of best practice

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ESCOs in the New Member States and Candidate Countries of the European Union: overview of current status

Based on the "ESCOs in Europe" 2005 status report published by the European Commission

Silvia Rezessy,
Central European University, Environmental Sciences and Policy Dept.
Paolo Bertoldi,
European Commission, Directorate General JRC

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Introduction

- In the last decade Europe has seen an increased interest in the provision of energy services: electricity and gas market restructuring and the push for sustainability;
- There is a very different level of development of the ESCO industry (in terms of e.g. types of services, size and turnover of ESCOs, number of ESCOs) in the various European countries;
- The status of opening of the electricity and gas markets varies too; by 1st July 2007 all customers shall be able to choose a supplier;
- The Kyoto Protocol entered into force on 16th Feb. 2005. The EU Emissions Trading System has started as from 1st January 2005;
- There is a still significant variance in the ESCO-related definitions and concepts;

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Structure of the presentation

- Setting common language: basic ESCO-related terminology;
- Overview of the features of the ESCO industry in NMS and CCs and of some commonly cited barriers to wider deployment of ESCO projects;
- Highlights from the preliminary analysis of the European ESCO and ESCO project databases;

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Definitions (1): energy service provider companies (ESPCs)

- ESPCs provide energy services to final energy users,
- ESPCs are consulting engineers specialised in efficiency improvements and providing a service for a fixed fee for their advice (and not being paid based on the results of their recommendations).
- Because often the full cost of energy services is recovered in the fee, the ESPC does not assume any risk in case of underperformance.

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Definitions (2): ESCOs

An ESCO also offers the same services; however, an ESCO differs from an ESPC in the following ways:

- ESCOs guarantee the energy savings (a performance guarantee can revolve around the actual flow of energy savings from a project, or can stipulate that the energy savings will be sufficient to repay monthly debt service costs).
- The remuneration of ESCOs is directly tied to the energy savings achieved;
- ESCOs can finance, or assist in arranging financing for the operation of an energy system by providing a savings guarantee;
- ESCOs retain an on-going operational role in measurement and verification of the savings over the financing term.

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Definitions (3): energy performance contracting

- Under an EPC arrangement an ESCO implements a EE or RES project and uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project, including the costs of the investment;
- The ESCO will not receive its payment unless the project delivers energy savings as expected.

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Types of financing arrangements

- **ESCO financing**: internal funds of the ESCO (own capital or equipment lease);
- **Energy-user/customer financing**: internal funds of the user/customer backed by an energy savings guarantee provided by the ESCO or borrowing in the case when the energy-user/customer as a direct borrower has to provide a guarantee (collateral) to the finance institution;
- **Third-party financing** (TPF) refers primarily to debt financing. As its name suggests, project financing comes from a third party, e.g. a finance institution, and not from internal funds of the ESCO or of the customer.
  - *ESCO borrows* the financial sources necessary for project implementation;
  - *Energy-user/customer takes a loan* from a finance institution, backed by an energy savings guarantee agreement with the ESCO. The purpose of the savings guarantee is to demonstrate to the bank that the project for which the customer borrows will generate a positive cash flow, i.e. that the savings achieved will certainly cover the debt repayment. Thus the energy savings guarantee reduces the risk perception of the bank, which has implications for the interest rates at which financing is acquired. The 'cost of borrowing' is strongly influenced by the size and credit history of the borrower.

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Country Survey: Central European Countries (1)

- There are some 30 ESCOs in **Hungary**. The larger ESCOs are mainly MNCs; the utility-based ESCOs are developing very intensively;
- More than two-thirds of ESCO customers are municipalities.
- Various trends over the years: earlier public lighting projects were most common, today CHPs also in DH are in the spotlight (feed-in for electricity generated in CHP). Industrial projects are getting increased attention;
- 'Pure' demand-side projects are rather difficult in CEE (esp. in the industrial sector), comprehensive solutions are offered to fix the whole system e.g. combining on-site co- or tri-generation with ESCO services;
- Banks and credit institutions are very active in financing ESCO projects;
- The Hungarian energy efficiency industry is better established than in most other countries with formerly centrally planned economies and also in some Western European countries. Various reforms, governmental programs, international aid, and local legislative, economic and financial conditions made it possible for the Hungarian ESCO industry to work successfully.

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Country Survey: Central European Countries (2)

- Several MNCs are operating as ESCOs in the ***Czech Republic***, mostly in public sector buildings, DH and industry.
- The requirement for mandatory energy audits above a threshold energy consumption in state-owned buildings and buildings of state-funded institutions and the obligation to implement all low-cost energy efficiency measures identified have supported the development of EPC that also includes the cost of the audit;

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Country Survey: other Central European Countries (3)

- 32 ESCOs are operation in in ***Slovakia***;
- some have developed from utilities, some have been established by IFIs; most are public-private partnerships (joint ventures with municipalities).
- There are 20 large DH projects, some EPC projects in hospitals, a swimming pool, service and industrial companies.
- Public authorities are getting increased attention and projects cover buildings of the public administration, street lighting and DH.
- Outsourcing in industry and tertiary sector is becoming common.
- The residential sector is becoming a target segment too;

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Country Survey: other Central European Countries (4)

- ***Poland*** has around 13-15 ESCOs, the majority of which are branches of foreign companies; most of them are operating mainly in the DH sector. Currently projects cover both the municipal (public buildings, infrastructure) and the private sectors (mainly housing cooperatives).

- In ***Slovenia*** 8 companies are capable of providing EPC and/or energy delivery contracting. Energy utilities with sufficient investment capital are entering the ESCO business. Electricity trading departments of distribution companies implement DSM activities. TPF has been provided mostly for projects in the public sector

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Country survey: the Baltic states (1)

- Since 2000, only 3-5 companies have started ESCO-related activities in ***Lithuania****;* mainly foreign subsidiaries, engaged in heat production and distribution and supply side energy management in the DH sector. The expectations for target market segments in Lithuania are buildings (residential and public buildings) and industry;

- In ***Latvia*** municipal and state property, together with the housing sector, have been considered for EPC; only 2 companies provide EPC;

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Country survey: the Baltic states (2)

- There are around 20 companies offering energy services in ***Estonia***, mostly ESPCs offering consultancy.
- Due to lack of strong market actors the shared savings concept does not seem to work. The first ESCO that appeared on the Estonian market started from the guaranteed savings scheme;

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Country Survey:Candidate Countries (1)

In ***Bulgaria***, ESCOs are functioning on a limited scale and primarily in the municipal sector; projects cover small heating plants. USAID has provided a loan portfolio guarantee. The World Bank has extended a 300,000 USD grant for an energy efficiency fund.

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Country Survey:Candidate Countries (2)

- By 1998 20 small private companies in ***Romania*** were trained the USAID to become ESCOs.
- The Romanian government, the World Bank and the GEF created the Romanian Fund for Energy Efficiency to leverage co-financing in particular from domestic banks. The industrial sector is initially the target, with commercial buildings and later municipal services to be included.
- There is a requirement for mandatory energy efficiency programs for large consumers and municipalities, but the low non-compliance penalty makes this provision non-enforceable.
- There is interest among banks to lend for energy efficiency projects, but they require guarantees from the project developer, so it is on balance sheet financing. This is greatly limiting the interest and capacity of both private and public sectors to get financing and implement such projects.

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Country Survey: other European Countries

- No ESCOs operate in *Malta* and in *Cyprus*;
- In *Croatia*, the first ESCO started operation in 2003 with assistance from the World Bank;
- No information on *Turkey*;

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Barriers to EPC

- Low awareness, lack of information, skepticism at the demand side;
- Limited understanding by FIs and high technical and business risk perception;
- Small size of the projects;
- Legal and regulatory framework incompatibility;
- M and V protocols not understood;
- Administrative hurdles;
- Lack of motivation;
- Limited governmental support (esp. in the household sector).

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Highlights from the preliminary analysis of the European ESCO database: general characteristics of ESCOs in Europe

- Most ESCOs have been founded either by large companies or as subsidiaries of large companies (equipment manufacturers, facility management companies, operation, management and construction companies or energy utilities);
- Under EPC arrangements ESCOs have so far provided financing themselves (mainly in France, Italy and Germany).
- Only recently have more ESCOs started implementing EPC using TPF: no matter that almost all ESCO projects in Europe have been based on the shared savings concept. Chauffage contracts are also commonly used. The guaranteed savings concept has been used rarely;
- The market is segmented in 'functionally specialised' companies;

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Highlights from the preliminary analysis of the European ESCO project database

- The majority of ESCOs' projects in EU MS have focused on co-generation; public lighting; HVAC and EMS.
- The majority of ESCO projects in Europe have been undertaken in the public sector.
- The recent energy industry restructuring has stimulated projects in CHP for large commercial centers, hospitals, and industrial facilities (BOOT contracts); it has also triggered public lighting projects, where municipalities tendered lighting operation, including the supply of electricity.
- In many cases ESCOs are more interested in the business of selling energy or equipment than in exploiting the financial opportunities of energy savings.

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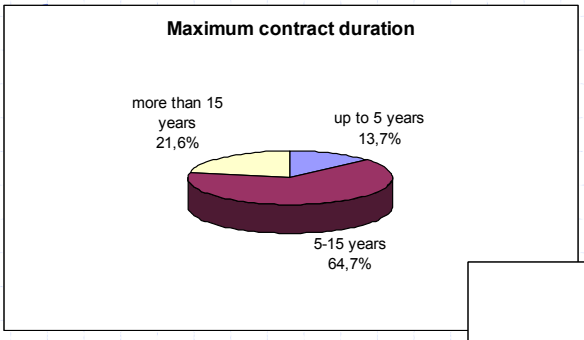
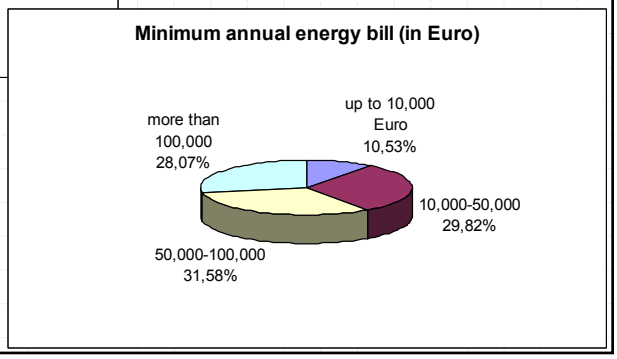
Criteria for passing contracts*

* Based on 51 responses





Conclusions

- The provision of energy services is a growing industry that involves a diversity of enterprises and covers a variety of activities;
- Supply side at present is attracting the lion's share of ESCO's attention (CHP the most common type of project). Projects in buildings still need policy support;
- The current status of the ESCO industry shows significant differences from country to country; Hungary and the Czech Republic are the top runners among NMS and CC;
- Recent policy developments, such as white certificate schemes as introduced in some European countries, may result in a strong development of the ESCO industry;
- In the long term, a combination of legislative measures, such as the proposed EUEE and ES Directive, coupled with strategic actions to foster both the demand for and the supply of energy services, could trigger a wide expansion of the ESCO business in all European countries
- Energy-efficiency projects offer a very cost-effective approach to reducing greenhouse gas emissions: will EU ETS through the Kyoto flexible mechanisms take them up?

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Thank you for your attention!

More information about the **"ESCOs in Europe 2005"** status report and the **European ESCO database** can be obtained from

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Silvia Rezessy: Ephlas01@phd.ceu.hu

or online at: http://energyefficiency.jrc.cec.eu.int/esco.htm

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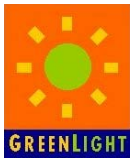
The European GreenLight, GreenBuilding and Motor Challenge Programmes: more opportunities for ESCOs

Paolo Bertoldi,
European Commission, Directorate General JRC



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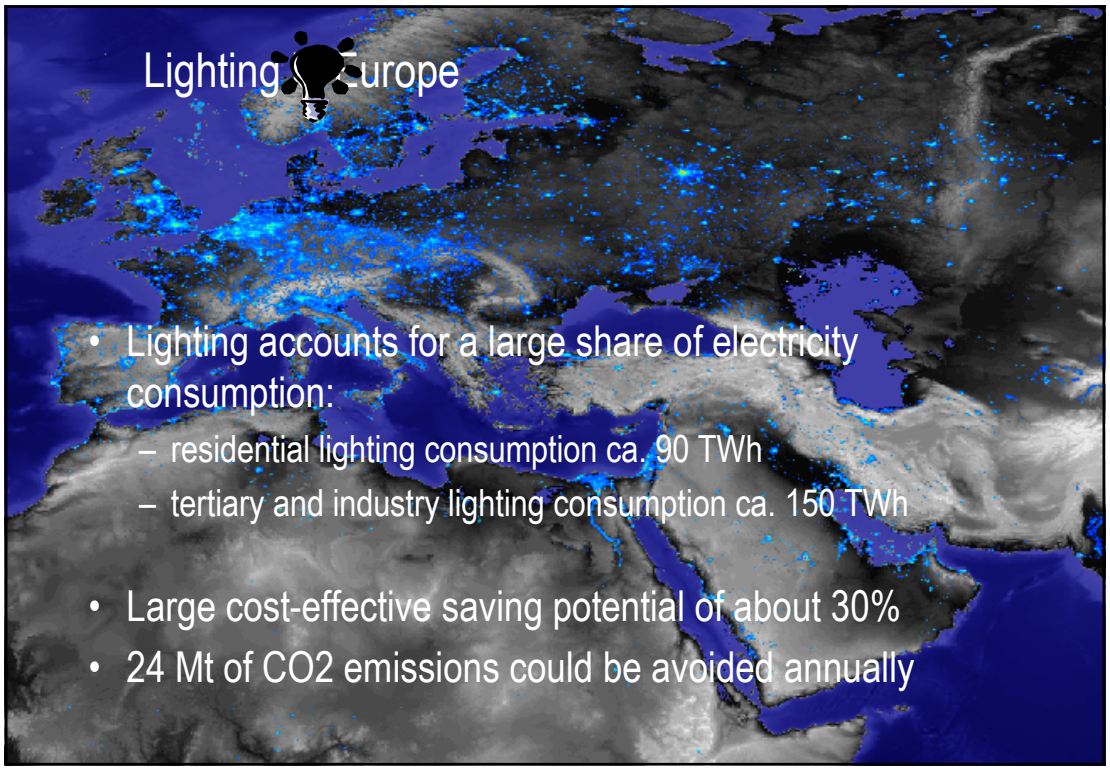
The European Climate Change Programme (ECCP)

- The ECCP recommended the adoption of new and strengthening of existing voluntary programmes to stimulate business and public authorities to undertake cost effective projects;
- The ECCP recommended in particular the further expand the GreenLight Programme (started in 2000), to launch the Motor Challenge (started in 2003) and to design the GreenBuilding programme (started in 2005);
- All these three programmes cover the non residential sectors and stimulate the co-operation between ESCOs and end-users.


Lighting Europe
• Lighting accounts for a large share of electricity consumption:
– residential lighting consumption ca. 90 TWh
– tertiary and industry lighting consumption ca. 150 TWh
• Large cost-effective saving potential of about 30%
• 24 Mt of CO2 emissions could be avoided annually


The GREENLIGHT Programme
OK to install energy-efficient lighting where:
1) it is PROFITABLE and
2) lighting quality is maintained or improved
Top-manager
GREENLIGHT

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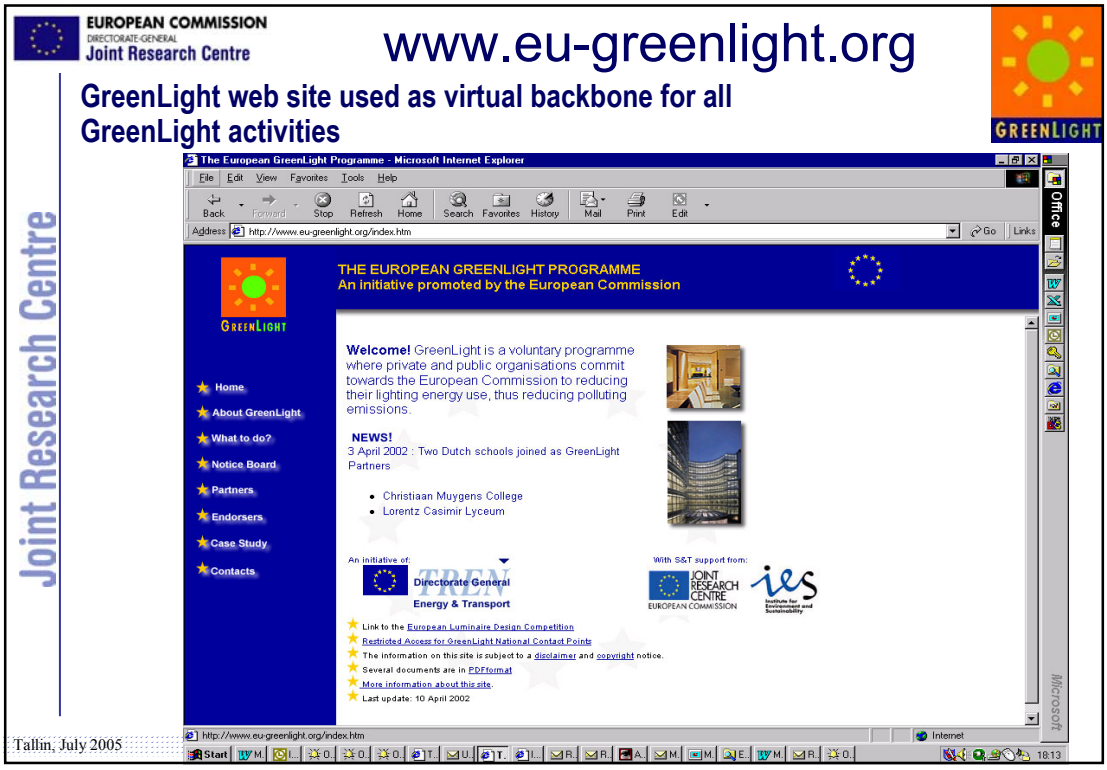
GreenLight is taking off

GREENLIGHT

Buildings Managers are getting more receptive to the messages ("save the environment and save money") of the GreenLight programme :

More than 1000 buildings concerned, with 215 partners

- **Office**
- **Industry**
- **Schools**
- **Sport Building**
- **Street Lighting**
- **Commerce…**



Paolo Bertoldi, European Commission DG JRC

A few GreenLight success stories by the GreenLight Partners of the Year for 2004

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City of Hamburg (Germany)

In 1992 the Free and Hanseatic City of Hamburg started the comprehensive campaign "Leuchtentausch – 2:1 fürs Klima" (luminaire exchange – 2:1 for the climate) for luminaire refurbishment in public buildings as schools, universities, sanitary arrangements, tunnelling, theatres and museums etc..

The results:

- **Refurbishment in 450 projects**
- **Investment volume: 22,7 mill. €**
- **Electricity savings: 22500 MWh/a**

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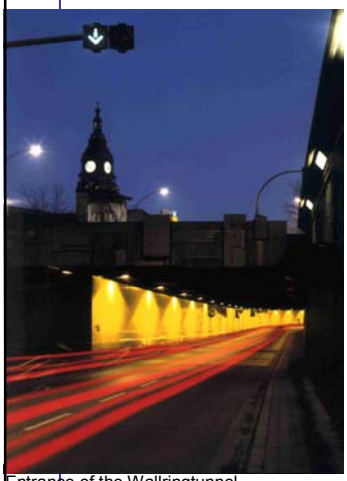
City of Hamburg (Germany)


Entrance of the Wallringtunnel

Example of measure (year 2000):

- Substitute fluorescent lamps with sodium lamps in tunnels

Results:

- Savings: 1 000 MWh/year
- Energy reduction : 72%
- Savings: 82 100 €/year

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CASINO (supermarket chain, France)

- 15 sites renovated , 130 000 m^2
- mercury vapour lamp 400W replaced by T5
- reduction of installed load of 45%
- Electricity Savings : **9500 MWh** per year
- Financial Savings :
- **415 000 Euros** per year

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Carrefour Italia (supermarket chain, Italy)

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Carrefour Italia (supermarket chain, Italy)

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- 12 sites renovated , 93 000 m^2
- installation of electronic ballasts, dimming based on daylighting, in some supermarket installed T5, lux reduced from 1700 to 900
- new company policy to install T5 everywhere
- Electricity Savings : **1998 MWh** per year
- Financial Savings : **209 225 Euros** per year

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Vital Eiendomsforvaltning AS (Norway)

Baseline installation	2 x 36W T8 1 x 36W T8	 30,8 w/ m²
Post installation	1 x 49 W T5 1 x 28 W T5	 10,2 w/ m²

Total area: 13.000 m²
reduced installed kW by **60 %**
reduced running hours by **20 %**
Reduced energy consumption by **67 %**

Total yearly energy consumption (lighting):

Baseline	**1200 MWh**
Post installation	**400 MWh**
Pay Back :	**4 years**

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Stadhuis Sittard (The Netherlands)

Installation of:
T5 lamps, dimmable electronic ballasts, day light control and occupancy sensors

Reduced energy consumption by 62 %

Total yearly energy consumption (lighting):

Baseline	**185200 kWh**
Post installation	**38210 kWh**

Energy savings 149980 kWh

Saving: 7350 Euro/year

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Athens Int. Airport "El. Venizelos" (Greece)

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Athens Int. Airport "El. Venizelos" (Greece)

ATHENS
INTERNATIONAL AIRPORT
ELEFTHERIOS VENIZELOS

Actions

Control System (BAS)
Electronic ballasts
3 buildings, 195 863 m^2

Results:

Improved light quality
Energy Savings: 3298 MWh/yr
Operating cost reduction:
131 956 € /year

Payback time: < 1 year

GREENLIGHT

Dolce&Gabbana - Show Room building

DOLCE & GABBANA

Show Room building

Lighting optimisation:

- **Dimmable T5 fluorescent lamps, metal halide and some halogen spot**
- **Lighting supervisory control system**
- **Yearly energy consumption: 70.000 kWh (1/5th than standard)**
- **Low maintenance costs**
- **Lighting energy saving (-80%)**
- **Air conditioning energy savings (-20%)**
- **high affordability and availability**
- **Investment cost decrease**

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GREENLIGHT

The city **of Sassari** installed a centralised dimming system to reduce its street lighting levels and thus its energy consumption and light pollution during periods of the night where traffic is lower. The city signed a "paid from savings" contract with the power control manufacturer and the installer. These financed up-front capital improvements in exchange for a portion of the savings generated.

Besides providing remote control capabilities, and thus easier maintenance, their system has provided 2412 MWh/year lighting electricity savings. (30% reduction of electricity use) in the areas covered is ca. 30%.

the investment has a payback time of 2,3 years.

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GREENLIGHT

Nike replaced the "old" light tubes and fixtures with new technology fixtures and tubes. These tubes give twice as much light. During the engineering study, Nike made sure that their employees have the right light level for their job.

The project reduces Nike annual energy consumption by 2000 MWh. This project has a positive Net Present Value (NPV) in less than 4 years.

	Baseline Lighting	Post installation lighting
Number of luminaires Type of luminaires Type of lamp	3157 2x58 KVSA TL lamp (T8)	1977 E5200/x35/x49p IHW TL lamp (T5)
Type of ballast	Conventionele ballast & T8	Elektronisch ballast & T5
Lamp total power	58 Watt	35 Watt
Lighting electricity use per year (kWh)	1.190.189	449.768
Payback time		3 - 4 years

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Provincia di Reggio Emilia refurbished the lighting systems for five schools.

For upgrading those school buildings they changed the lamps with new, more efficient ones, using in the same time low consumption electronic ballasts.

The lighting control system dims the lamps' output in response to daylight availability and occupancy of the rooms.

For an area of 30.081m2 they installed 2.419 new lamps, the price of the total investment being around 492.966 euro.

The schools reported much better visual conditions and the following savings:

- Lighting electricity savings: 1.724 MWh/year (38%)
- Energy cost savings: 98.268 euro/year
- Payback time: 4 years

GreenLight National Contact Points in 26 countries

Paolo Bertoldi, European Commission DG JRC

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GreenLight Results

GREENLIGHT

Joint Research Centre

- Savings of ca. **100 GWh/year** as of today (**30,000 tCO2** avoided; **5 Meuro/year** saved);
- Many interesting example of cost-effective projects using different technologies: T5, electronic ballasts, aluminium reflectors, dimming & daylight control, occupancy sensors, metal halides, etc.;
- By joining GreenLight, companies make good business sense;
- GreenLight is a win-win programme;
- GreenLight has stimulated the ESCO business in the EU
- Rate of registration is steadily increasing

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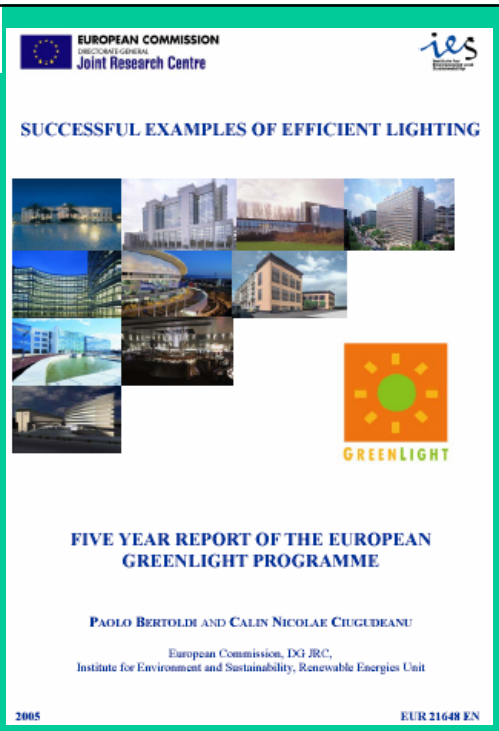

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Technical developments

- new design of facade with natural ventilation
- high insulation – solar gain with heat protection
- high efficient lighting systems with daylight control and occupancy controls
- reduction of cooling demand
- thermoactive heating/cooling in floor/ceiling
- low electricity demand of office equipment
- efficient combined heat and power supply
- absorption chillers

GREENBUILDING

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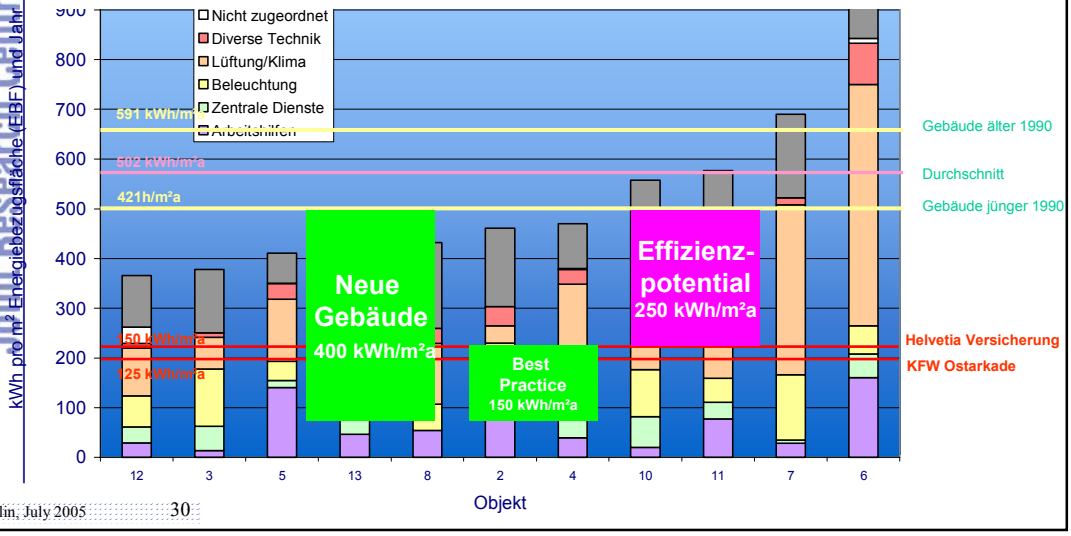
GREENBUILDING

Primärenergieverbrauch

There is still a high potential for efficient new and existing office buildings



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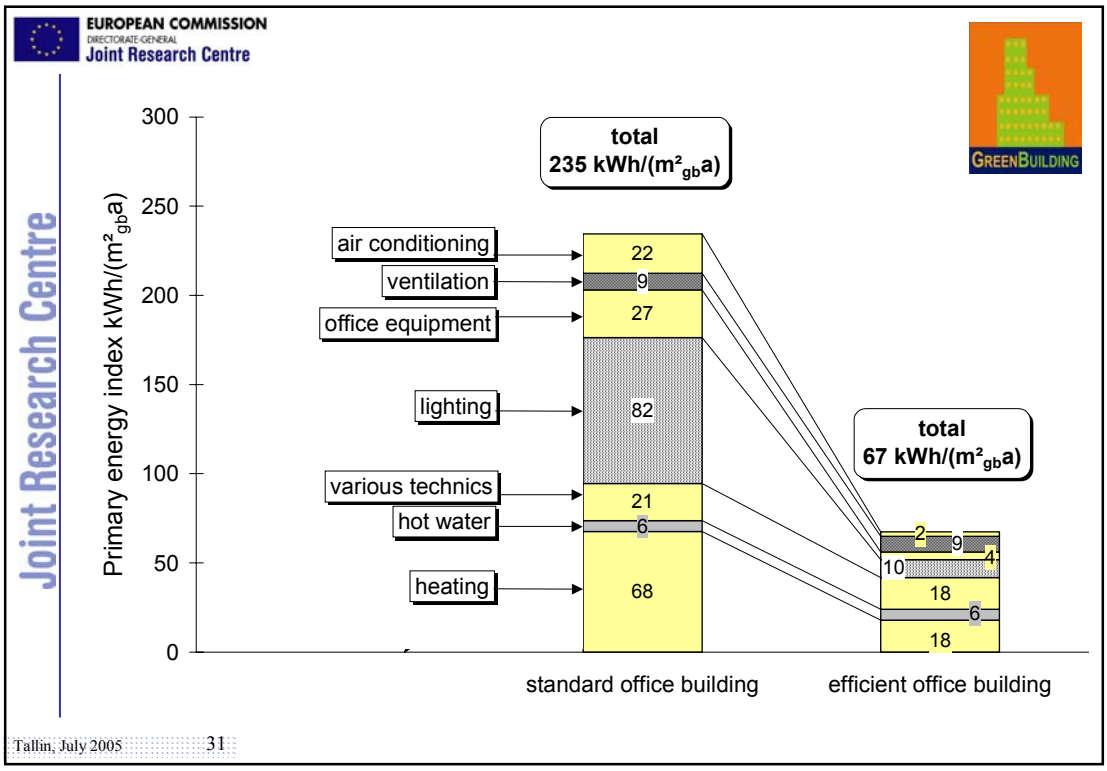
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GREENBUILDING
Primary energy index kWh/(m²gba)
300
250
200
150
100
50
0
total
235 kWh/(m²gba)
air conditioning
ventilation
office equipment
lighting
various technics
hot water
heating
22
9
27
82
21
6
68
total
67 kWh/(m²gba)
2
9
4
10
18
6
18
standard office building
efficient office building
Tallin, July 2005
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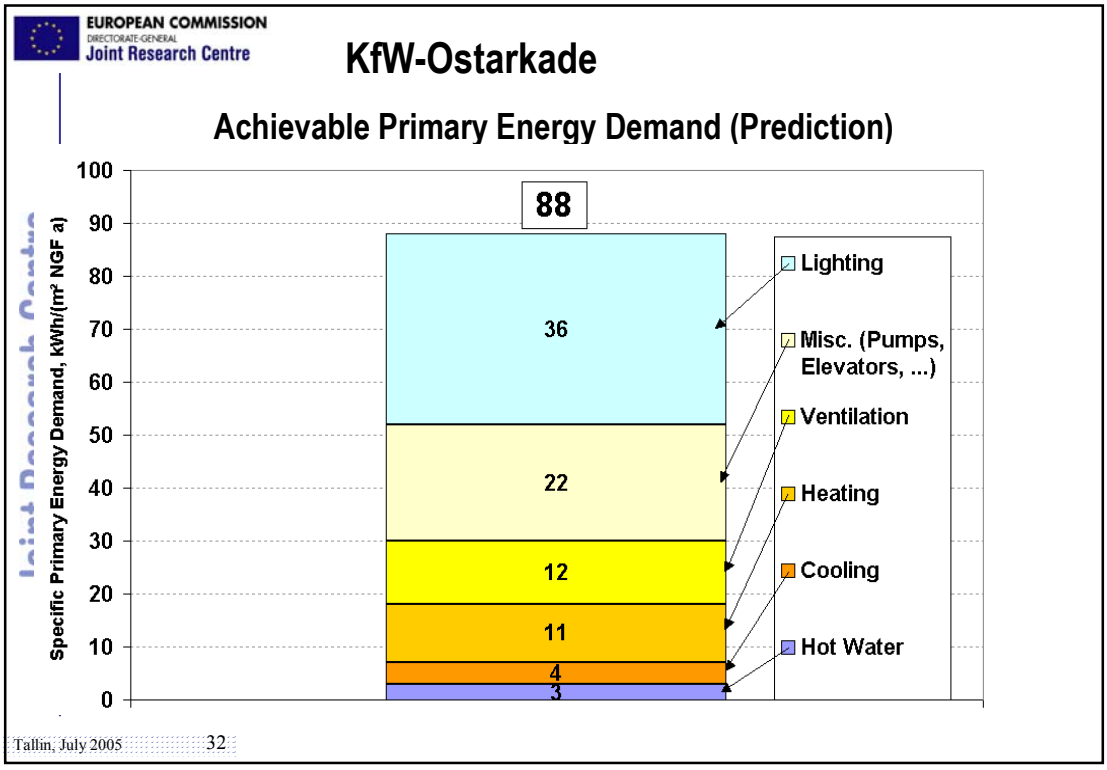
EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre
KfW-Ostarkade
Achievable Primary Energy Demand (Prediction)
Specific Primary Energy Demand, kWh/(m² NGF a)
100
90
80
70
60
50
40
30
20
10
0
88
36
22
12
11
4
3
Lighting
Misc. (Pumps, Elevators, ...)
Ventilation
Heating
Cooling
Hot Water
Tallin, July 2005
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Objectives of the GreenBuilding Programme

Joint Research Centre

- GBP is designed and will be operated in order to contribute to the EU objective to **reduce energy demand in buildings**.
- GBP main goal is to **stimulate "additional" cost-effective** energy efficiency and renewable energies projects in **non-residential** buildings.
- GBP will help and facilitate the implementation of the new **Directive on Energy Performance of Buildings** (EPB Directive) by promoting and disseminating its requirements.
- The objective of the GBP is to help overcome **most of the barriers** to energy efficiency and renewables in buildings - in particular the **lack of interest and information**, **technical capabilities** and **access to finance**.

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Objectives of the GreenBuilding Programme

Joint Research Centre

- GBP will also **complement the EPB Directive** by stimulating energy efficiency measures in **existing** buildings, in particular by stimulating energy efficiency in **smaller refurbishments** (compared to what required by the EPB Directive) and/or by stimulating only energy efficiency projects (without building refurbishment, for example for office equipment, lighting, HVAC) and by introducing mandatory energy management in building (not cover by the EPB Directive).
- GBP will create a set of **resources and building examples** to facilitate the technical developments associated with the EPB Directive

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Joint Research Centre

HOW ?

by **providing information and technical support**, including information about:

- energy management and energy audit;
- building and system upgrades;
- M&V;
- ESCOs and financial opportunities;

to **companies wanting to commit to adopting energy-efficient measures** (both equipment/building upgrading and energy management practices) in buildings and by providing **public recognition** for their efforts and results.

GREENBUILDING

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The GreenBuilding Approach

In the case of existing buildings:

- **A company/organisation becomes Partner when they decide to upgrade an existing building, following the recommendations of the energy audit provided that the upgrades pass the profitability test. The criteria (use of best technology and no possible cost-effective more efficient alternative).**
- **The company can choose a whole building energy approach or a modular approach (e.g. renovating only a specific end-use sector, e.g. air-conditioners, lighting, etc. - see next slide), provide the chosen module captures a large part of the potential energy savings.**

GREENBUILDING

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Joint Research Centre

Areas of Action in GreenBuilding

Electricity loads:

- **Lighting;**
- **Office Equipment;**
- **Electric Appliances (refrigeration, washing, cooking);**
- **Distribution Transformers and UPSs;**
- **Lift and elevators;**
- **Heat pumps;**
- **Air-conditioning and Ventilation;**

Other fuels:

- **Heating, water heating and steam (boilers);**
- **co and tri-generation;**

Building shell (insulation, windows);

Passive cooling, heating and natural ventilation;

Renewable Energies (solar, biomass, etc.);

GREENBUILDING

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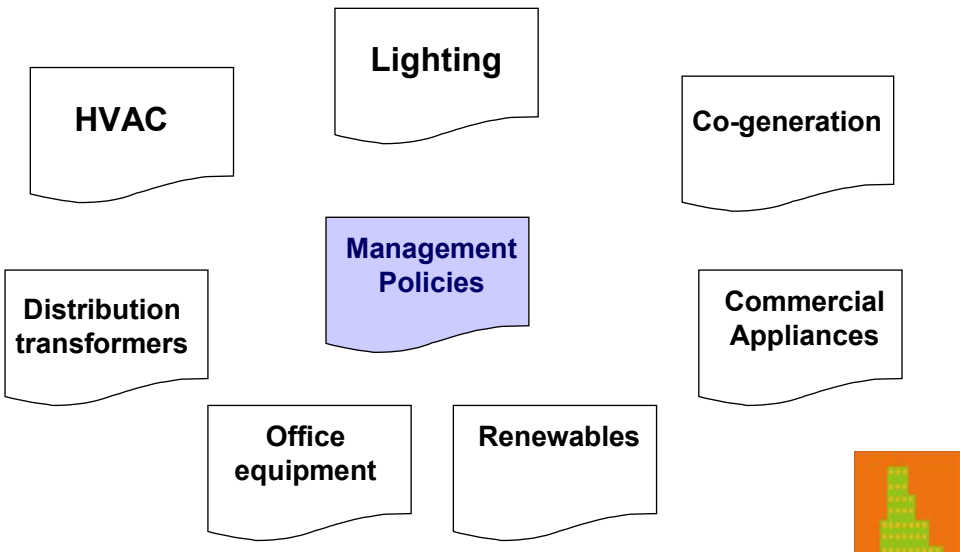
GreenBuilding Modules



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Key principles of the GreenBuilding Programme

- **Elevate** decision-making about efficiency in buildings to senior corporate officials.
- Appoint **GreenBuilding Manager** in the company.
- "**à la carte**" commitment.
- The programme contains **Modules** defining the technical nature of an appropriate commitment for each energy service. Modules recommend:
  - cost-effective measures (IRR > 20% or LLCC)
  - which maintain or improve working conditions (air quality, lighting quality, etc.)
- Obligation to **Report** building projects and data.
- Adoption of company **Energy Management Policy.**

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Key principles of the GreenBuilding Programme

- The "**Management Policies**" Module is required by all participants and is supposed to aid them in making energy efficiency an element of management priorities at every step of the life cycle of a building.
  - Results of DoE energy management programmes showed that up to 80% of the savings could be attributed to the energy efficient practices of staff and the operations and maintenance staff.
  - Examples include continuos and preventive maintenance, building commissioning, equipment purchasing policies (e.g. LCC), continuos monitoring of energy consumption.

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Benefits for participants in the GBP

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- Direct **financial** benefits by saving money and in most cases improving working conditions.
- Indirect benefits resulting from the **growing attention** of consumers and investors.
- Possibility to link the project to national **CO2 emission** reduction programme or other (Green/White certificates).
- **Information** resources.
- **Public recognition**/endorsement.

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Benefits to public authorities

Joint Research Centre

- Support for other programmes such as **Energy Star, Audit**;
- No need for **direct financial incentives** to trigger energy efficiency/renewable projects;
- Building up of **building data set** for case studies and benchmarking exercise;
- Possibility to test/verify early versions of the integrated new **measurement test** for building energy performance;
- Early **implementation of building Directive** and possibility of testing of national building certification schemes. It goes beyond the Directive as also small refurbishments are included and specially targeted;
- Establishment of effective **public/private partnerships;**

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Other important & positive outcomes

- Helps promoting the Energy Service and **ESCOs** industry.
- Foster a **real integration** at building level of energy efficiency and renewables.
- Promote the energy efficiency and renewable industry.
- Promote the role of the **Energy managers** as a professional figure.
- Create awareness for important practices such as **M&V**, **energy audit**, **continuous maintenance**, **commissioning**, "**Green" procurements**, **Life Cycle Costing.**

GREENBUILDING

MOTOR CHALLENGE

The European Motor Challenge Programme

An initiative by the European Commission

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Joint Research Centre

Joint Research Centre

Why Motor Driven Systems ?

- Motor driven systems account for 69% of European industrial electricity consumption;

and

- offer High Savings Potential at low cost
  - Up to 30%
  - over 100 TWh/yr

MOTOR CHALLENGE

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LKAB (Sweden)

Measure:

- removal of unnecessary motors

Results:

- Energy cost savings: 105 000 €/yr
- Payback time: 0.3 year

MOTOR CHALLENGE

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The Motor Challenge Programme Objectives

- **Reliability** — **Equal or better**
- **Quality of Service** — **Equal or better**
- **Cost** — **Reduced**

MOTOR CHALLENGE

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The Motor Challenge Programme

OK to a Motor System Action Plan:
1) it is PROFITABLE and
2) QUALITY & RELIABILITy is maintained or improved

MOTOR CHALLENGE

European Commission

Top-manager

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Motor Challenge Procedure

- **Inventory systems →**
  - **Identify cost saving measures**
- **Enterprise formulates an *Action Plan***
  - **Voluntary**
  - **Meet the Reliability/Quality/Cost criteria**
- **Commission approves plan →**
  - ***Partner* status**
- **Execution of Plan**
  - **Annual reporting**
  - **Commission renews *Partner* status**

MOTOR CHALLENGE

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Systemic Approach

• **System design:**	Meet user needs
• **Drives:**	Motor selection
	Transmission
• **Motor+System controls:**	Adjustable speed
	Follow demand
• **Compressor, fan, pump:**	High efficiency
	Appropriate type
• **Distribution system:**	Size, topology
	Leaks, ...

MOTOR CHALLENGE

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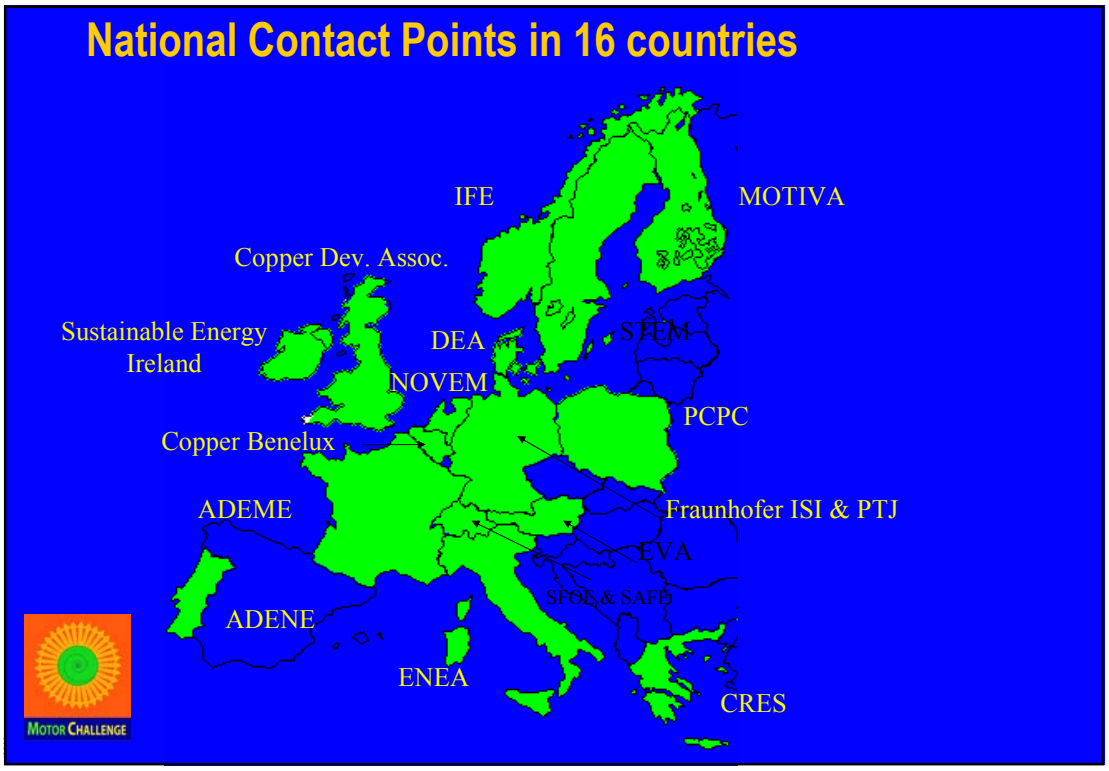
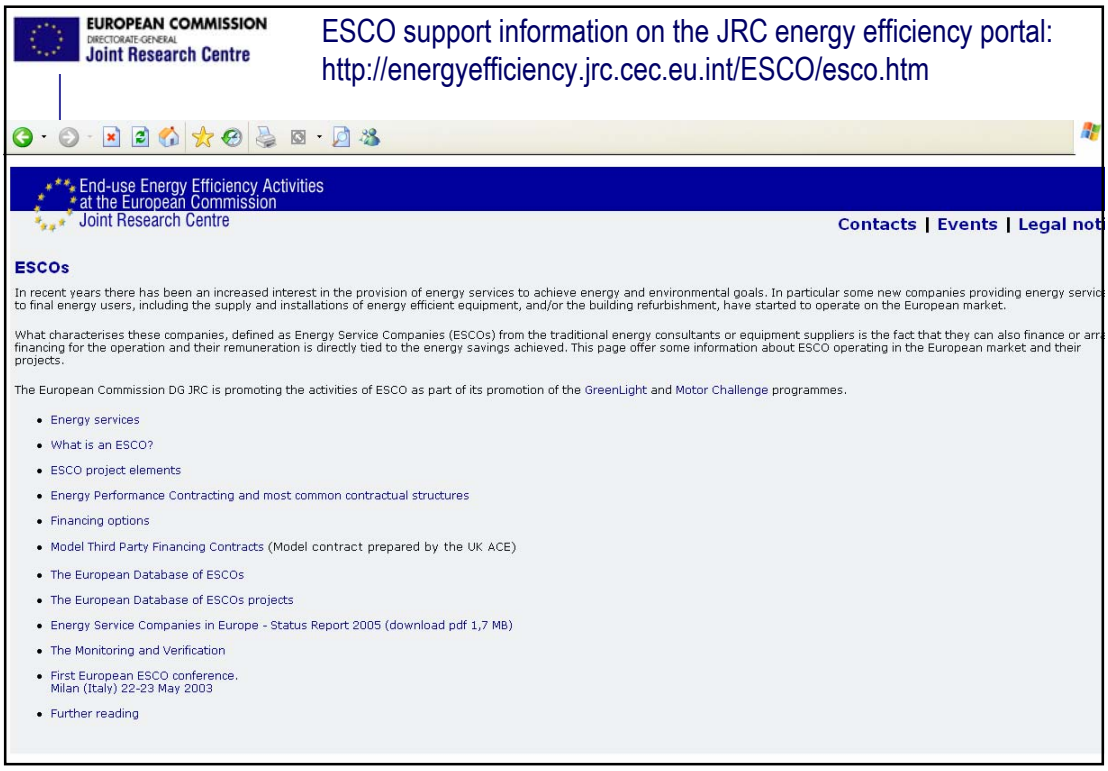
Technical Assistance for Partners

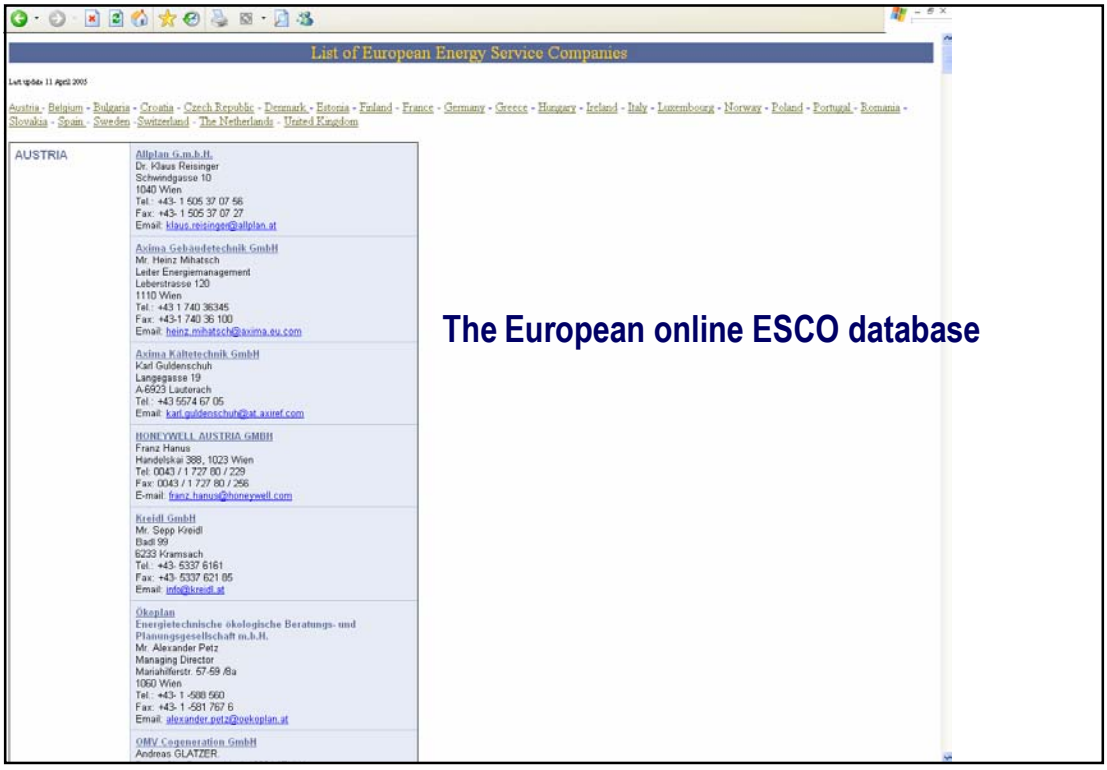
- Programmes of participating national energy agencies
- Motor Challenge Tool Box
  - software (e.g. EuroDEEM)
  - documents
  - technical and financial decision aids
  - list of Endorsers and ESCOs

MOTOR CHALLENGE



Paolo Bertoldi, European Commission DG JRC





Paolo Bertoldi, European Commission DG JRC

EUROPEAN COMMISSION
DIRECTORATE-GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Environment and Sustainability
Renewable Energies Unit

ESCO Characterisation Form

Date: _____

Name of the ESCO: _____

Internet address: http:// _____

CONTACT PERSON

First Name: _____ Last Name: _____

Address: _____

Tel: _____ Fax: _____ E-mail: _____

URL: _____

ESCO PROFILE

Company profile (short description of activities, type of projects and mission): _____

_____

In which country your company is operating: _____

CRITERA FOR PASSING A CONTRACT WITH A CLIENT (OPTIONAL):

Minimum client energy bill (Euro): _____ Max. contract duration: _____

PLEASE CHECK THOSE THAT APPLY AND ADD MORE COMMENTS/DETAILS IN THE LAST COLUMN:

	SERVICE FUNCTIONS	DESCRIPTION	COMMENTS Please add explanations on how your company implements and/or offers the services
☐	Project Identification and Appraisal	Preliminary audit and selection of a number of energy saving options applicable	
☐	Project Technical Design	Detailed design specifications of the energy saving measures	
☐	Project Implementation	Identification of supplier companies, management of installation works and commissioning	
☐	Project Financing (or Third party Financing)	This is the key characteristic of an ESCO. The ESCO may finance up-front capital improvements in exchange for a portion of the savings generated or give a saving guarantee to the client to be used to get credit. Please specify whether the ESCO provides it own financing or through a bank (credit risk) or it gives only a guarantee of the energy savings	
☐	Guarantee of Performances	The ESCO is prepared to accept the part of technical and financial risks that it can control. The performances are measured and verified according to a contractually defined Protocol (monitoring and verification Protocol)	
☐	Operation Service	Management and/or maintenance of the equipment for a time period, which can be either the test period or a longer one, as contractually stipulated	
☐	Purchase of the Fuel/Electricity	The ESCO can take care of purchasing the fuel or electricity and selling the energy service to the client in terms of heat, cool, lighting, etc.	
☐	Insurance Coverage	Depending on the type of Guarantee of Performances given to the client, the ESCO can, in turn, be insured against events that can imply financial penalties for the ESCO	

	SOCIETAL CHARACTERISTICS	DESCRIPTION	Please add explanations on the activity of your company
☐	Independent Specialist Company	A company specifically set up for providing ESCO services	
☐	An equipment supplier	Supplier of particular energy efficiency equipment (indicate which type of equipment)	
☐	An energy utility or supply company	Gas or electricity utility or oil supplier	
☐	A public sector energy agency	A public agency or company, either at national or municipal level	
☐	A public-private joint venture	A Joint Venture created to merge together the expertise and access to the market in this specific energy field	
☐	A operation & maintenance company		
☐	Other	Specify:	

Please return this form to:

European Commission
Joint Research Centre
Mr. Paolo Bertoldi, TP 450
I-21020 Ispra (VA) – ITALY

paolo.bertoldi@cec.eu.int

For the EU list of Energy srervice Companies visit:

http://energyefficiency.jrc.cec.eu.int/esco.htm

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ENERGY SERVICE COMPANIES IN EUROPE

STATUS REPORT 2005

PAOLO BERTOLDI AND SILVIA REZESSY

European Commission, DG JRC,
Institute for Environment and Sustainability, Renewable Energies Unit

2005 EUR 21646 EN

Few copies
available here.

Can be mailed to you
Or
Can be downloaded
From the web

Paolo Bertoldi, European Commission DG JRC

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
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THANK YOU

FOR MORE INFO

paolo.bertoldi@cec.eu.int

http://energyefficiency.jrc.cec.eu.int

Tallin, July 2005 59

"Energy Efficiency potential in buildings, barriers & ways to finance projects in New Member States and Candidate Countries"

Tallinn 6 - 8 July 2005

" Energy Services Companies: Status and Related Projects"

INTERNATIONAL FINANCING PROTOCOL

Anees Iqbal

Maicon Associates Limited

Energy Services Companies: Status and Related Projects

This presentation will Cover 3 areas:

- International Financing Protocol
- International Performance Monitoring & Verification Protocol
- Creation of a Energy "Benefits" Fund

Energy Services Companies: Status and Related Projects

What is an ESCO

•Develops, finances, implements and operates Energy Efficiency Projects (EEPs) on a turn-key basis

• Risks repayment of the capital investment on actual Performance

• It is a Service Company not a Bank

Project Financing and ESCOs

- Viable Project Financing is mandatory for ESCO to deliver "paid from savings" business model.
- Lack of long-term financing is the most significant barrier to the development of an international ESCO industry and the widespread implementation of EEPs.

Solution?

No immediate solution because international energy efficiency markets (like Estonia) are not developed enough to motivate local Financial institutions ("LFIs") to invest in a new EEP lending infrastructure.

Energy Services Companies: Status and Related Projects

Access is the real barrier

- EEPs are unable to access "reliable" and "commercially viable" long-term financing.
- Problem is NOT a lack of available funds!
- Problem is getting access to funds

Energy Services Companies: Status and Related Projects

Why is access difficult ?

- Lending from Local Financial Institutions ("LFIs") not traditional:
  - Corporate Lending – generally Asset based
  - Energy investment risks not understood – thus perceived too high
  - Interest Rates too high
  - Repayment Term too Short
- Lending from International "IFIs" not applicable:
  - Size of Projects too small
  - Due diligence too cumbersome
  - Require hard currency repayment

"Difficulty" of Financing EEPs

Local Financing Institutions (LFIs) typically:

- Are accustomed to providing "asset-based" lending at 70%-80% of the market value of assets being financed, or other collateral.
- Do not recognize the Cash Flow generated by EEPs as a new asset to be valued in the financing structure (credit enhancement).
- Are not familiar with the intricacies of financing EEPs - creating a perceived high-risk lending profile for EEPs.
- Do not have the internal capacity to properly evaluate EEP risks/benefits nor to structure their financing in market-acceptable ways.
- Are unwilling to invest the time and resources needed to develop lending infrastructure due to relatively small dollar size of each EEP.
- Experience market conditions that preclude commercially-viable financing to EEPs (high interest rates and short repayment terms).

One Proposed Solution :

Develop an Energy Efficiency Financing Protocol

- Tailor made for EU member states and Candidate States
- Model it on the International Energy Efficiency Financing Protocol (IEEFP)
- To become known as European Energy Efficiency Financing Protocol
- We suggest the Acronym " EEEFP" or " 3EFP " for short
- Should become the "blue print" for LFIs to finance EEPs in the EU

Energy Services Companies: Status and Related Projects

What is International Energy Efficiency Financing Protocol ?

- Adapted to each country to create a sustainable lending infrastructure within the LFIs
- Facilitates the development & promotion of the ESCO sector
- Relies on each local market to train its LFIs on intricacies of financing Energy Efficiency Projects
- Mandates use of International Performance Measurement and Verification Protocol ("IPMVP")
- Developed by Tom Dreessen through NAESCO under DOE funding in 2002
- Was One of five recommendations from the Energy Futures Coalition's International Working Group

Energy Future Coalition

(www. energyfuturescoalition. org)

The International Working Group's 5 recommendations

Recommendation #1: Private-sector leadership
Business, labor, nonprofit Council on Energy and Development to follow up on Johannesburg partnerships and mobilize capital for global energy development.

Recommendation #2: Global Development Bonds
New class of securities for sustainable energy investments in developing countries, leveraging tax incentives, risk insurance, and matching funds.

Recommendation #3: Rural Energy Fund
Pilot program to aggregate capital for proven best practices to alleviate energy poverty in developing world.

Recommendation #4: Revise lending guidelines
Extended-term financing by export credit agencies for low-carbon energy technologies.

Recommendation #5: Efficiency protocol
Standardized financing protocol for end-use efficiency projects.

International Performance Measurement & Verification Protocol "IPMVP"

- IPMVP is an international set of standardised procedures for the measurement and verification (M&V) of savings in EEPs
- Widely accepted and adapted, it conveys consistency in the prediction and achievement of energy savings
- Translated into 10 languages and now used in 40 countries.
- 5000 copies ordered each year.
- May be downloaded free from www.ipmvp.org.
- Promotes recognition of the value of Efficiency Savings.
- Savings measured under IPMVP procedures can encourage Financiers to treat savings as a real asset.

"3EFP" Profile

Focuses on the "Savings Value" of EEPs for loan repayment and credit capacity review

- Tailored to local conditions to train banks on intricacies of financing EEPs

- Creates procedures/guidelines for evaluating and assessing benefits and risks.
- Creates sustainable lending infrastructure
- Provides Minimum Criteria for EEP lending and use of "proven" technologies
- Develops generic terms and conditions to be included in various Agreements (Loan, Security, ESCO, Construction, etc.)
- Develops and mandates use of standardized savings protocols based on "IPMVP"
- Creates training manuals, workshop materials and case studies for LFIs
- Provides Minimum Criteria for EEP lending and use of "proven" technologies
- Develops generic terms and conditions to be included in various Agreements (Loan, Security, ESCO, Construction, etc.)
- Develops and mandates use of standardized savings protocols based on "IPMVP"
- Creates training manuals, workshop materials and case studies for LFIs

An additional Solution

Establish an EEP "Benefits" Fund in EU

- **Drive market growth of the energy efficiency industry**
- **Financial incentives provided to End Users and Local Financial Institutions.**

"Benefits" Fund – Key Features

- **"Supplements" but does not "Finance" EEPs**
- **Source of funds usually corporate**
- **Examples:**
  - **From Ratepayer Fees like in the US**
  - **Brazil's through 1% ANEEL Fund**
  - **EU Phare Energy Funds**
- **Possible Funding from Emissions Credit Trading (EU or World Bank ?)**

"Benefits" Fund - Advantages

- No Government access or intervention
- Repayment in Local Currency
- Managed by individuals who have previous project financing experience of EEPs
- Require use of "3EFP"
- Require use of "IPMVP"

Energy Benefit Fund - Incentives

Incentives for Local Banks

- Increases returns to Local Banks that utilize 3EFP
- Guarantees a Portion of Loan Losses to Local Banks
- Cover extended Repayment Terms

End User Incentive

- "Buy-Down" Interest Rate to Below Market Rates

CONCLUSION

Benefits of IEEFP & Benefits Fund

- Creates a Commercial Lending Infrastructure for financing EEPs that can be sustained!
- Accelerates growth in EEP implementation and ESCO industry
- Trains Local/Regional Staff of LFIs to finance EEPs - "Capacity Building"
- Eliminates Currency Devaluation Risk barrier
- Permits Aggregated Financing of EEPs
- Delivers long term Energy & GHG reductions

The Role of Energy Audits and Public Procurement to Foster the ESCO Industry

Jiří Zeman
SEVEn, o.p.s.

TAIEX-JRC Workshop
Tallinn, July 7, 2005

SEVEn, o.p.s.
Středisko pro efektivní využívání energie
The Energy Efficiency Center

- not-for-profit
- non-governmental
- consulting organization

established in 1990 with a mission

to achieve the twin goals of economic development and environmental protection through energy efficiency

Czech Energy Efficiency Act

- Compulsory Energy Audits
  - In 4 years (by 2005) all facilities >1500/35000 GJ
  - About 200 certified energy auditors
  - EA: if not implemented – gets outdated soon
    - changes in facility, some measures implemented, changed prices, …
  - Compulsory implementation in state owned facilities
- Pro:
  - wider dissemination and implementation of energy efficiency projects, information for management
- Con:
  - quality problem, too costly and formal, too short period for implementation

SEVEn

Energy Audits for EPC

- Detailed specification of
  - baseline energy consumption
  - relation to assumptions (heating degreedays, …)
- Estimated cost-effective energy savings potential
- Potential for EPC
  - Meets required cost-benefit criteria (payback period)?
  - Risk analysis – (future utilization of facility, financial stability of the client)

SEVEn

Energy Performance Contracting

- Overcomes financing problem in public facilities
- Guarantees technical and economic performance (costs and savings)
- Suitable for some types of projects
  - Reasonable payback and risks
  - Potential savings also in the *mode* of operation

SEVEn

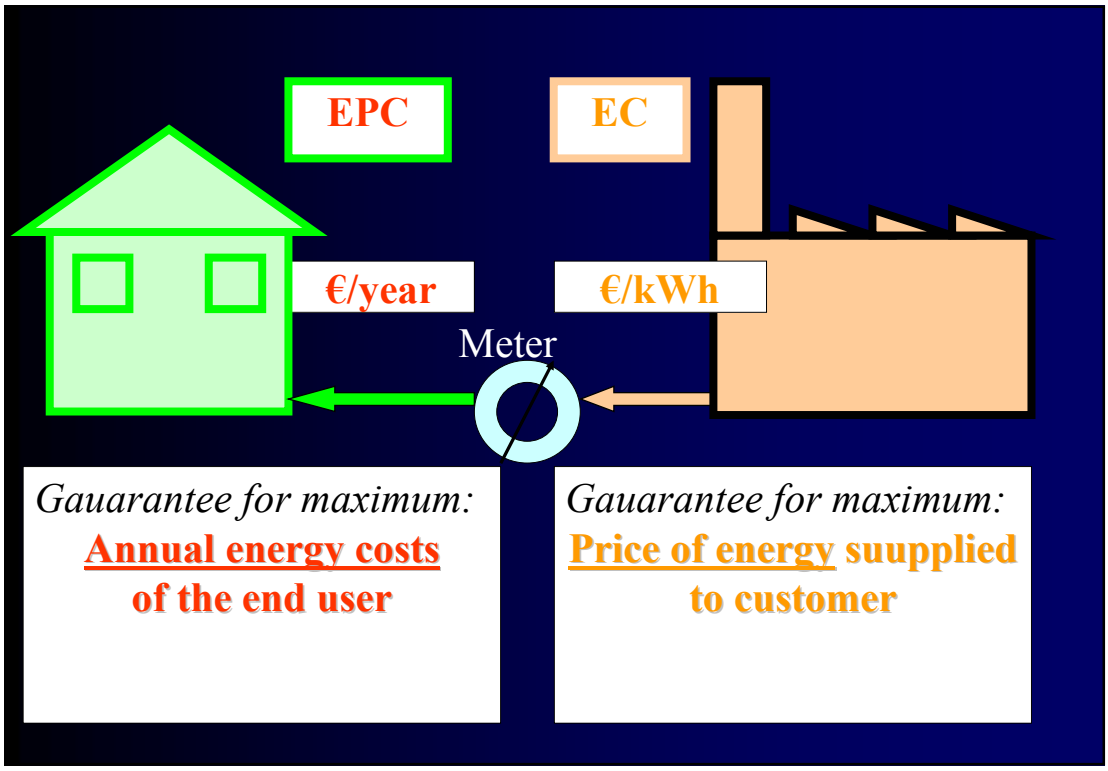
EPC versus EC

- ***EPC - Energy Performance Contracting***

Guarantee for total energy costs

- ***EC - Energy Contracting***

Guarantee for costs of supplied energy



EPC Tendering

- Private Sector
  - Flexible, not regulated
- Municipal sector
  - Regulated by law, but relatively flexible decisions
- State owned facilities
  - Regulated by law, specified procurement procedures for traditional investment projects only (not for EPC)

SEVEn

Public Procurement Legislation

- Long-term process of development of legislation for public procurement
  - Open tender
  - Call for bids
  - Negotiation procedure
    - Suitable for EPC

SEVEn

Public Procerement for EPC

Negotiation procedure:

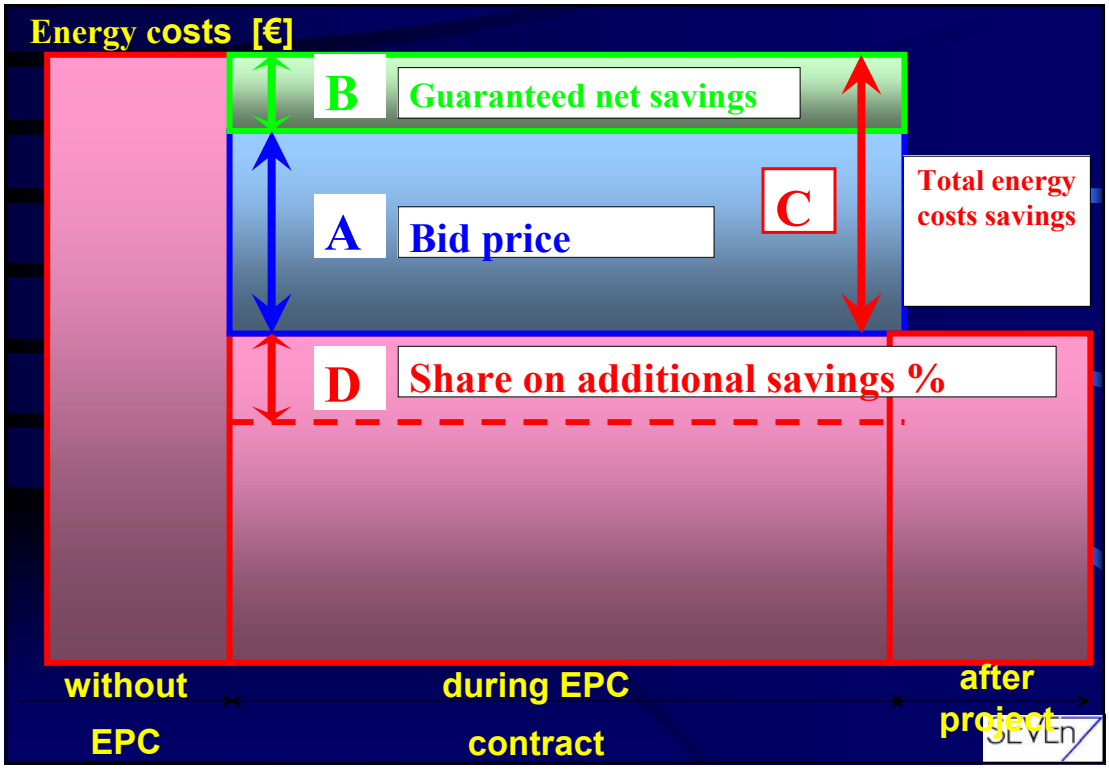
- Qualification criteria
  - ECO references, experience, financial stability, …
- Tender documentation
  - baseline study,
  - tender criteria,
  - EPC contract, …
- Negotiation process
  - several steps
- Selection of ESCO and signature of contract

SEVEn

Tender Criteria

- Qualifying criteria - compulsory requirements
  - Contracting period,
  - Minimum energy savings,
  - Type of guarantee,
  - Compulsory measures/technology, …
- Selection criteria
  - A. Bid price (investment, costs of ESCO services, financial costs) (€)
  - B. Guaranteed net savings of customer (€)
  - C. Share of customer on additional savings (%)
  - D. Total energy/operation costs savings (€)
  - E. Energy savings in technical units (MWh)
  - Investment costs (€)
  - ….
- Criteria weights

SEVEn



Example I

- B – Guaranteed net savings: 50-60%
- C – Total energy costs savings: 20%
- D – Share on additional savings: 10%
- Investment costs: 20%
- A – Bid price: 1%

Maximizes value of savings in €

SEVEn

Example II

- E – Energy savings in MWh: 50-60%
- A – Bid price: 40-30%
- D – Share on additional savings: 10%

Requirement for investment in standard end use technology reconstruction

SEVEn

EPC Public Procurement

- Need for *customized set* of criteria reflecting *specific* client goals and project needs:
  - ESCO qualification criteria
  - Minimum compulsory/qualifying requirements
  - Set of selection criteria
  - Weights of criteria
- Development of EPC projects is a complex process
  - Learning by doing
  - Experience in assessment of what set of criteria will select what type of specific technical offer and EPC bid

SEVEn

Thank you

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jiri.zeman@svn.cz, www.svn.cz

SEVEn

SEFI UNEP BASE

The UNEP Sustainable Energy Finance Initiative
A joint initiative of UNEP Energy Branch, UNEP FI, BASE

SEFI SUSTAINABLE ENERGY FINANCE INITIATIVE www.sefi.unep.org

SEF DIRECTORY A LISTING OF LENDERS AND INVESTORS www.sef-directory.net

BASE
CH-4051 Basel
base@energy-base.org
www.energy-base.org

BASE Germany
D-79098 Freiburg
Volker Krauth,
Managing Director

2

‚Creating the climate *for* change'

to pave the way for a global scale-up of investment in energy efficiency and renewable energy.

SEFI's mission
To **promote, facilitate**, and **support** increased investment in energy efficiency and renewable energy by

- **informing and connecting investors,**
- **creating a stable environment to catalyse investment flows,**
- **and minimising risk and uncertainty.**

3

SEFI ACTIVITIES

Provide Information

In any new economic sector, the need for accurate, timely, and standardised information is critical.
To provide this information, SEFI

- Develops resources, tools and activities that lower barriers to investment in the sustainable energy sector;
- Communicates investment activity in the sustainable energy sector to the broader finance community; and
- Promotes awareness raising, training, and policy frameworks within financial institutions for investing in sustainable energy.

4

SEFI ACTIVITIES

Facilitate Networks

To facilitate and develop networks, SEFI

- Brings financiers and developers together to facilitate the deal origination and project capitalisation process, to share best practice on sustainable energy finance, and to promote overall investment in the sustainable energy sector;
- Builds credibility in the finance sector and within financial institutions for investment in sustainable energy; and
- Helps financiers create common platforms on sustainable energy finance, such as investment forums.

5

SEFI ACTIVITIES

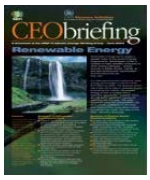
Create Partnerships

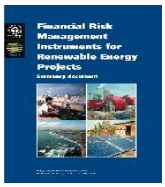
To create partnerships with and within the finance sector to launch innovative financial products tailored to sustainable energy investments, SEFI:

- Develops and promotes joint Bank/UN initiatives and other public-private partnerships;
- Links donor funding with the finance sector to buy down and share risks; and
- Provides incentives for new financial product development that targets regions of the world currently without access to modern energy services.

6

SEFI SERVICES





A growing portfolio of **tools, guidelines**, **reports, services**, and **capacity-building** activities that help financiers understand the opportunities for sustainable energy investment and assess and manage the risks, improve deal origination, and lower the transaction costs of their first investments in the sector

SEFI ACTIVITIES

BASE International Investment Forum for Sustainable Energy

The BASE Investment Forum is a regular event that brings together key individuals from the finance community and the renewable energy and energy efficiency business.

The BASE Forum enables investors to make first-hand contact with innovative sustainable energy start-ups and projects and to explore investment opportunities directly with the project sponsors.

SEFI ACTIVITIES

BASE

BASE Coaching

BASE Coaching is a practice-oriented coaching program developed to help entrepreneurs in the sustainable energy sector improve their fundraising skills and investors to identify the risks and opportunities associated with investments in sustainable energy.

The program is currently being offered in Germany, France, and Switzerland and will soon be extended to other countries.

9

RELATED ACTIVITIES

BASE

Coordination

Berlin Energy Agency, Alexandra Waldmann

Aims of the project:

To contribute substantially to the acceleration of the market for energy services in Europe by further development of Energy Performance Contracting schemes

Project Website:

http://www.eurocontract.net

EMPRESS

Aim of the project: The Energy Management and Performance Related Energy Savings Scheme (EMPRESS) will support energy efficiency efforts in Eastern and Central Europe. The project will help establish specialised energy service companies (ESCOs) that provide Monitoring and Targeting (M&T) energy services to industrial and commercial clients.

Project Website: http://www.uneptie.org/energy

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SESSION 4:

ENERGY SERVICES COMPANIES: COUNTRY REPORTS

Profile of company - C-TERM spol. s r.o.

C-TERM spol. s r.o. was created in 1992 focused on operating the thermo-technological installations (TTI) in the area of municipality Petržalka.

At present C-TERM belongs to Dalkia group, which represents an European leader in **operating the energy installations** in district heating. In Slovakia Dalkia operates TTI in the following towns: Senec, Vráble, Brezno, Poprad and Kráľovský Chlmec.

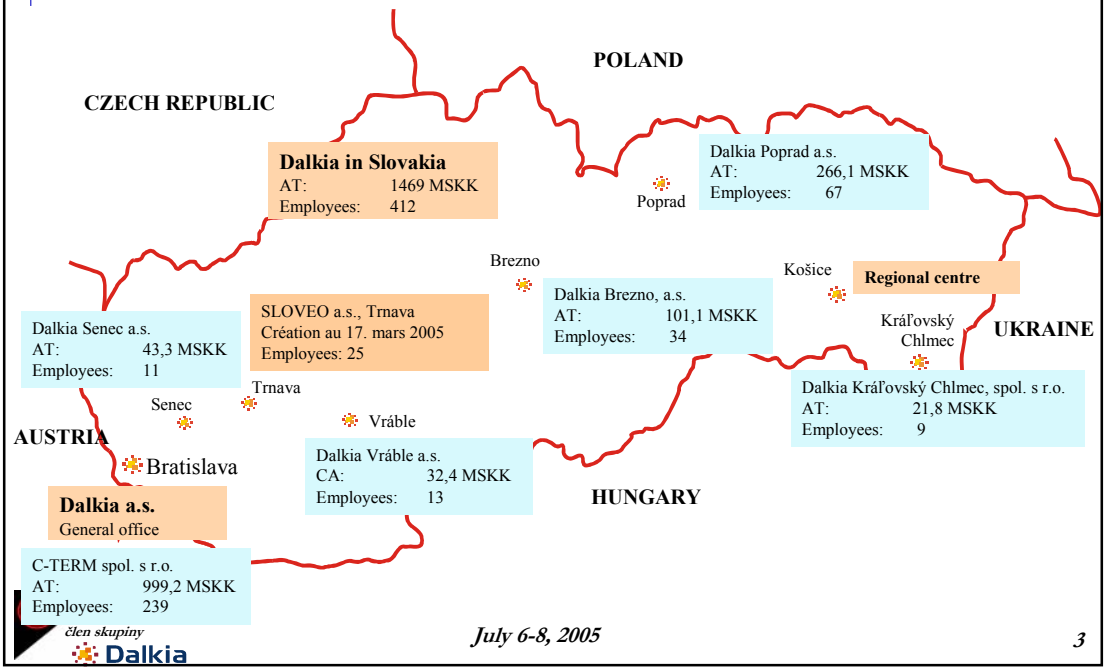
Dalkia

Dalkia is situated on 5 Continents, in 35 countries, with annual turnover of 4 671 MEUR.

July 6-8, 2005

2

Dalkia in Slovakia



July 6-8, 2005 3

ESP, ESCO players in Slovakia

- **International companies active on the Slovak market (French, German, Austrian)**
- Dalkia driven by PPP partnership
- ESTAG driven by PPP partnership
- VnG driven by PPP partnership
- Siemens Building Technologies driven by technologies
- **Czech companies**
- Intech s.r.o. driven by technologies (CHP)
- Komtherm – independent specialist company
- TENERGO, EVČ – BES – driven by PPP partnership
- **Slovak companies**
- Elektrovod group, Slov – energia a.s., Independent specialist company
- **Financial institutions**
- Dexia a.s., IFC

člen skupiny Dalkia

July 6-8, 2005 4

Preparation of support to ESCO on national level

- **Definition** of the National energy policy in 2005
- **Target - Increasing energy efficiency**
- **Tools for improvement:**
- define methodology for calculation of energy cost-effective integrated economy for building
- define minimal requirements for energey efficiency of new buildings
- define minimal requirement for energy efficiency of existing big-sized building which are modernized
- implement energy certification of buildings
- put minimal conditions for technical parameters of technical infrastracture of building
- introduce regular control of boilers and climatization systems in the buildings with age of technical infrastracture is more than 15 years.

Basic data of C-TERM

Turnover (2004)	999,2 MSKK
Number of employees	231
Installed capacity	501,7 MW_t
Number of boiler houses	44
Number of substations	188
Lengths of distribution	48 km
Number of heated households	46 644
Number of clients	437
Investments (2000-2004)	246 MSKK

Energy efficiency project – Elementary schools in Petržalka

On July 1, 2002 - the part of competences from VÚC (Office of the Region) was transferred to municipalities, one of them is: municipality directly manages of 16 elementary schools in Petržalka.

Former operation executed by state organisations was insufficient in case of reparations and investments:

➔ high costs to insure thermal comfort

Before 2003 C–TERM has supplied heat only to the point of substations. After transfer of competencies C–TERM proposed to municipality of Petržalka to take over operating TTI till the radiators, with the aim to invest and insure energy savings.

Audit results – Elementary schools in Petržalka

In September 2002 C-TERM executed an audit of thermo-technological installations. The result of audit is as follows:

High costs and inefficient operating of TTI related to thermal comfort in elementary schools in municipality of Petržalka with potential of savings 15% at minimum.



Starting point 2003

Some details resulting from the technical audit:

- inexpert operating TTI in elementary schools
- unperformed permanent maintenance and modernisation of TTI
  - ➔ emergency of some installations

from technical point of view:

- heating connection does not meet current needs
- inconvenient heating connection to caretaker´s household
- non-functional control system
  - ➔ manual regulation of heating needed
  - ➔ in the time of low need of heat it is impossible to regulate and put out of action.

Energy efficiency project – Elementary schools in Petržalka

Aim of the C–TERM proposal:
To execute necessary investments and reparations by long-term contract in order to repay the investments through Energy efficiency contracting principle.

Investments:

pipelines	0,3 MSKK
hydraulic regulation	3,5 MSKK
circulating pumps	2,5 MSKK
regulation of output parameters	3,9 MSKK
thermostatic valves	0,9 MSKK
changing the connections	0,2 MSKK
TOTAL	11,3 MSKK

Energy savings evaluation

To be able to measure the savings contributions of proposed arrangements the independent institution **Slovak energy agency** has been asked to:

- prepare analysis of original state of installations
- evaluate costs related to provided heat comfort in 16 schools before and after the investment plan
- methodology for **transparent approval** of measured yearly savings

člen skupiny Dalkia

July 6-8, 2005

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Common contribution

On the part of municipality Petržalka:

- cost savings in heat comfort providing represents 1,48 MSKK in 2005
- decrease of annual consumption of heat of 12,58 % in 2004 in comparison with 2002

On the part of C-TERM:

- payback (savings included) = 4,7 years
- payback (savings non included) = 8,5 years
- enlargement of business
- reference as pilot EPC project in tertiary sector

Common contribution
Bilateral confidence and cooperation in frame of PPP

člen skupiny Dalkia

July 6-8, 2005

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ESCO growing markets in Slovakia

Main conditions

- minimizing risk of changes on use of building
- market pressure – liberalization
- access to energy audit

Today main areas

- municipal buildings (administration, public use)
- schools, educational institutions
- banks
- hospitals

ESCO in Poland: Activities, Market, Barriers

Andrzej SZAJNER
Sigma Termodynamik Ltd.
Gdynia, Poland

Introduction

- Different ESCO and third party financing (TPF) concepts have been introduced, tested and developed; TPF projects aim at:

➔energy conservation measures in local systems (e.g. housing settlement, hospital or military bases), or

➔improvement of street lighting;

- Representative purchaser of the service
  - a municipality (heating – own task), or
  - property owner/administrator.

Background

- In a typical situation:
  - ✓facilities of a potential client use excessive amount of fuels and energy,
  - ✓with shortage of own capital.
- External provider of funds and professional service ➡ a solution for reducing energy costs.
- However ESCO concept often seen only as profit-oriented business with no obvious advantages to the potential client. ➡

Successful ESCO projects

- small projects in schools, especially in the country-side ➡ the whole decision-making process is in hands of the local administration; DWH projects!!
- street lighting, the other own task of communes where savings resulting from retrofit could finance ESCO project;
- retrofitting of heating systems in military barracks.
- industry ??!!

Two big ESCO projects Poland

- **World Bank** involvement the Energy Service Company in Krakow - to enhance the ESCO position on the market and to support ESCO in undertaking energy efficiency measures in different facilities including less-feasible measures.
- Lodz ESCO project supported by **EBRD** is to select the best third-party partner to invest in energy conservation measures in Municipality owned facilities (schools, office buildings, sport centres and cultural buildings etc.). The selection of a long-term partner is based on the best offer for the energy performance contract.

Barriers

- The public procurement procedures, evolving over time make:
  - difficult selection of the best potential ESCO partner;
  - not well suited for long-term ESCO contracts,
- Municipalities aware of limitations and insecurity,
- Positive change: new Public Procurement Law Act of 29 January 2004 (implementation of Directive 93/37/EC) on works concessions:
  - works contracts and their execution include:
    - the right to operate the facility
    - or this right together with payment

Barriers II

- Regulations of the Energy Law ➡ heat price at the lowest levels within approved tariffs and recovery of invested capital by ESCO is in many cases difficult if not impossible.
  - Licences and tariffs for heat production, distribution and trade of less than 5 MWt (till 2005 - 1MWt)
  - Modernisation results in tariff reduction
  - Not possible keeping base heat costs

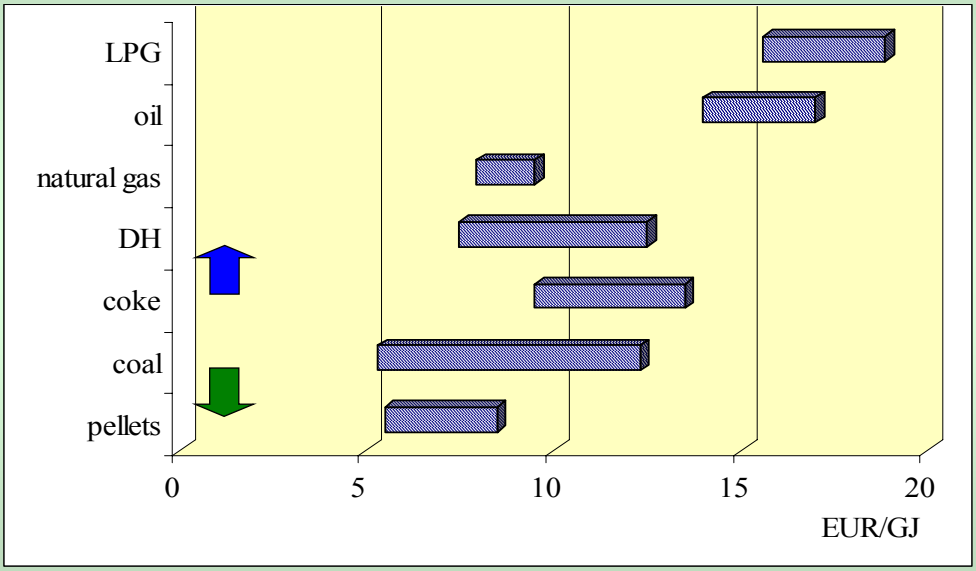
Barriers III

- Some potential clients cannot offer reasonable **guarantee/security** for long-term contracts:
  - ➢ hospitals, municipalities
    - ➢ changing of law,
    - ➢ high debts,
  - ➢ housing cooperatives and associations of owners
    - ➢ problem with debt security
    - ➢ complex property issues
  - ➢ exception ! – military bases
    - ➢ all elements suitable for TPF concept

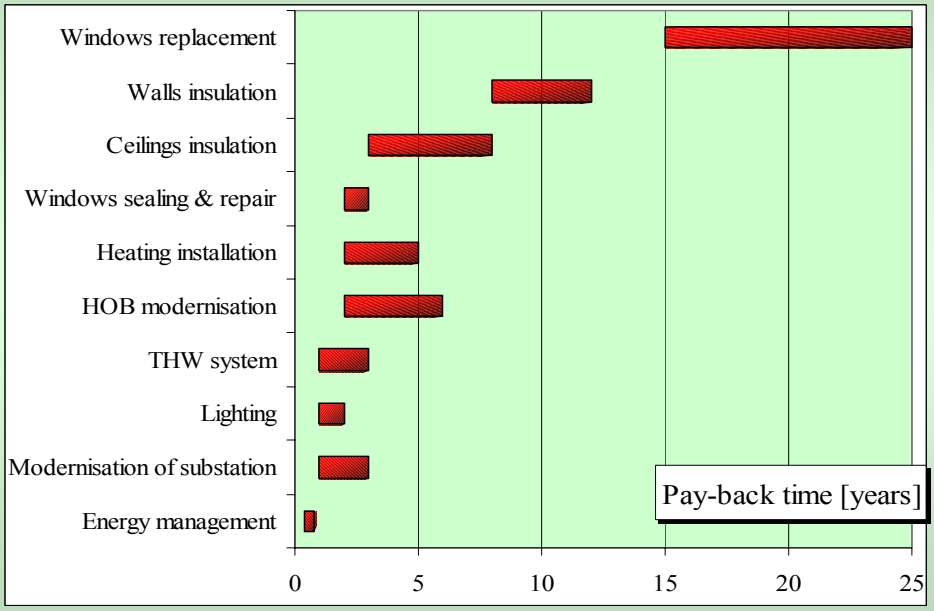
Barriers IV

- Macro-scale conditions:
  - relatively high interest rates,
  - difficulties in acquiring long-term loans by ESCO companies,
  - limited ESCOs investment capabilities,
  - fuels price structure: low coal prices in comparison to NG and DH,
  - long pay-back time of ECM,
  - lack of good examples,
  - low awareness of ECM implications.

Prices/Conversion of fuels



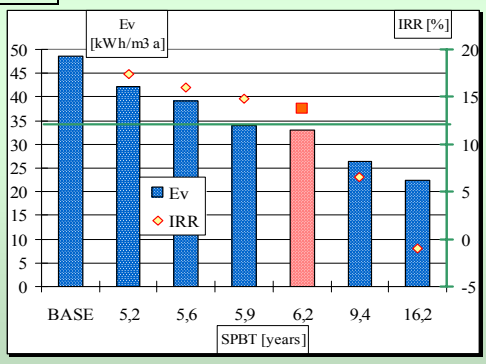
ECM pay-back time



OPTIMISATION OF THERMOMODERNISATION

			Savings		
	Ev	SPBT	demand	energy	costs
OPTION	kWh/m^{3}a	years	%	%	%
B	42,3	5,22	0%	13%	9%
C	39,1	5,59	14%	20%	18%
BC	34,0	5,90	14%	30%	25%
BCD	32,9	6,22	19%	32%	28%
BCE	26,5	9,39	30%	46%	41%
BCDF	22,4	16,24	34%	54%	48%

B	modernisation of heating installation
C	ceiling insulation
D	north-walls insulation
E	walls insulation
F	windows replacement



Example of optimisation of a school

Barriers V

Finally other available financial mechanisms supporting energy conservation measures like:

- Thermomodernisation Low
- environmental funds (national, regional, local, Ecofund)

do not support TPF-projects.

ESCOs face financing problems ⇨

Bankruptcies!!

THERMOMODERNISATION LAW

("Law on Supporting Thermomodernisation Projects"):

- introduced in January 1999, modified over years
- replaced state subsidies by financial support of feasible thermomodernisation projects
- loans („THERMO loans") given by commercial banks (all major banks)
- supported by the state budget
- incentive - thermo-renovation bonus

Thermo-renovation bonus

- **25% of the loan**
- loan ≤ 80% investment (the remaining part – own contribution)
- pay-back time of the loan ≤ 10 years
- monthly payments ≤ monthly savings
- thermo-renovation performed in accordance with energy audit and technical design

Good example

Military bases, selected:

- typically 10-30 buildings, canteen, DHW
- old, often steam heating system,
- old equipment, coal/coke boilers,
- high coal consumption (however reduced)
- contract for 10 years
- base year costs, inflation rate index
- typical conversion: gas, DH, oil (?)
- special conditions for bidders (security)

Types of Contracts

- "First Pay Out"
- "Chauffage" (typically adopted in Poland)
- "Shared Savings"
- "Guaranteed Savings"

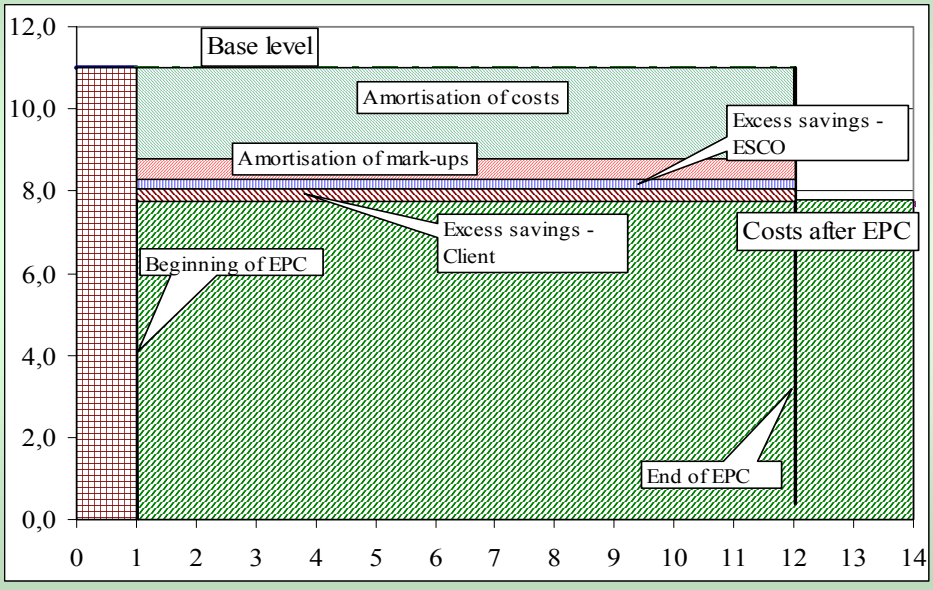
"Chauffage"

- ESCO pays utility bills, charges client for Energy Services such as heat, light
  - for an agreed number of years,
  - pre-contract cost level, indexed.
- Designed for "closed book" arrangements
- Can be unclear for the client:
  - the level of work actually done, and
  - the amount of savings really achieved

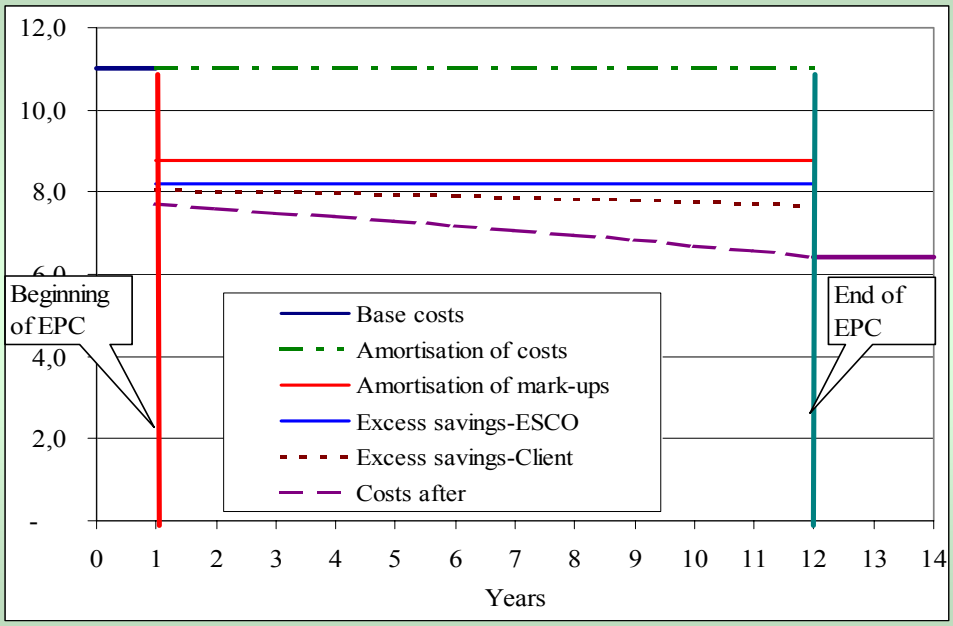
Types of Risk

- Construction (costs, technical problems, unexpected and additional works)
- Costs/Savings Performance
- Client credibility
- ESCO Operations
- Customer Satisfaction

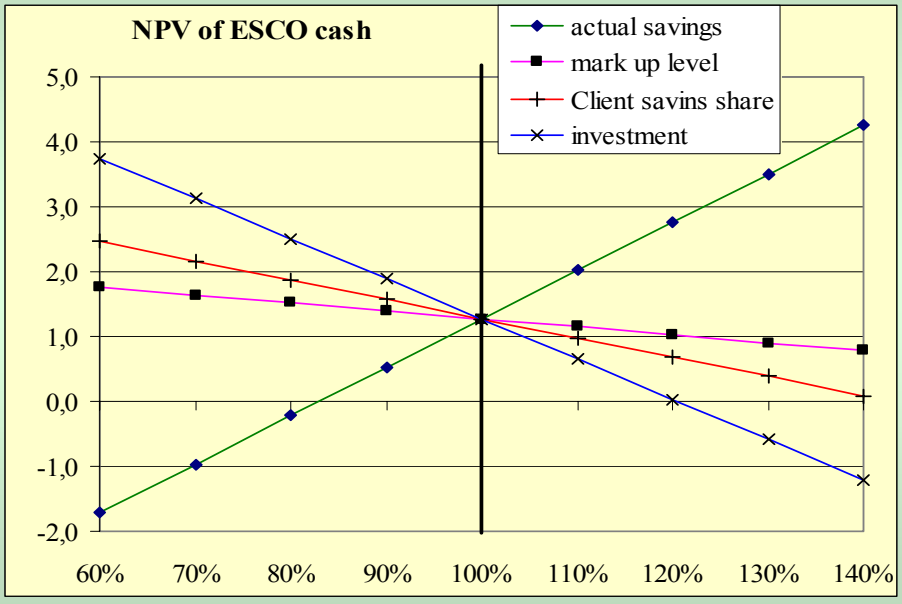
Guaranteed/shared savings EPC



Shared savings, incentives for both ESCO and Client



Sensitivity of ESCO result to major parameters



Conclusions

- ESCO/TPF should be one of major tools for restructuring of Polish energy systems
- ESCO in Poland has been tested only at limited scale
- There are many barriers preventing/slowing down TPF progress
- Successful examples are not acknowledged
- ESCO/TPF has not gained general support of potential clients

ESCOS IN THE HUNGARIAN ENERGY MARKET

Gergely Rodics

Greenergy Ltd.
Budapest

GREENERGY

Energy policy in Hungary

- Overall concept for national energy policy prepared in 1993 (upgraded in 1996), today outdated, no orientation
- Mid-term orientation for the energy market players: to meet international requirements
- Market liberalisation in 2003/2004 electricity/gas (not for households)
- New Act on Electric Energy – June 2005

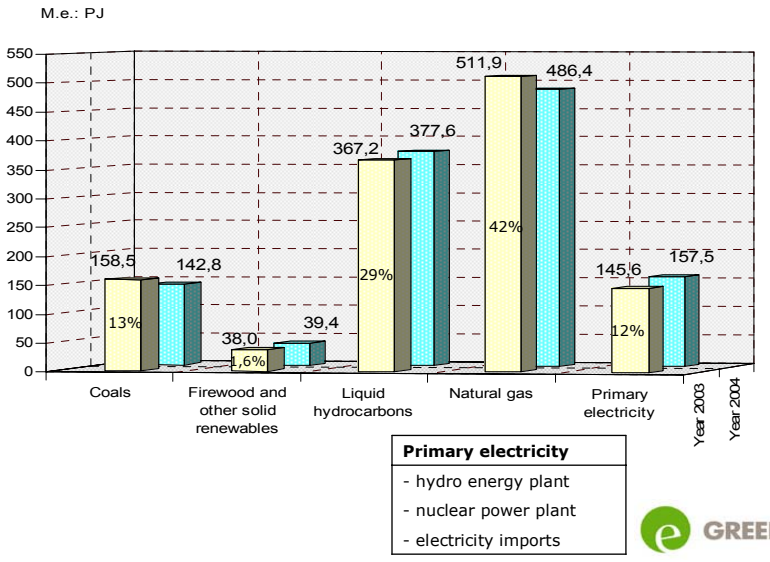
GREENERGY

Basic data on the Hungarian energy market - 2004.

- Primary energy production 423 PJ
- Total energy use 1077 PJ
- Import 75%
  incl. nuclear fuel from Russia
- Electricity demand 40 599 GWh
- Renewable in total en. use 3,9%
- Low VAT for coal & natural gas (15%)

GREENERGY

Structure of primary energy 2003-2004



GREENERGY

Private and municipal gas usage

Network connection:

- 2822 settlements (88%) are connected
- 72% of the households use nat.gas, additional 22% use PB
- 98% of municipal institutions use nat.gas

District Heating:

- 240 DH systems in 97 settlement (3%)
- 650 thousand households (17% of all) are connected to DH
- 70% is based on natural gas

GREENERGY

ESCOS on the MARKET

GREENERGY

ESCOs in Hungary

Number of ESCOs in Hungary - 2004.

- Apx. 30 (100-200 had such projects)
- 5-6 of them covers 80% of the market

Typical fields of service

- Energy audit
- Planning
- Financing
- Project management
- Building
- Operation (outsourcing)

GREENERGY

Market segmentation

	Share	Trend
Industrial solutions	1/3	▲
District heating (retrofit and development)	1/3	▼
Municipalities (schools, hospitals, other institutions)	1/3	▼
Renewable energy	few	▲

GREENERGY

ESCO projects by applied technology

- Heating and hot water 50%
- Industrial hot water/steam supply 30%
- Co-generation 28%
- Air conditioning 9%
- Renewable energy 9%
- Automatic heating regulation 8%
- Others: indoor/public lighting, building insulation, door/window modernisation

GREENERGY

ESCO projects – general data

- Project duration: 7-10 years
- Payback time: average 5-7 years, in some cases 3-4

GREENERGY

Project finance

- Typically: Equity (25-45%) / Bank loan 55-75%)
- Grant programmes
  - Energy efficiency credit programme (interest rate: 1/3rd of the basis rate of the Hungarian National Central Bank)
  - Phare credit programme (interest rate: 0%, max. 1/4th of the investment costs)
  - UNDP-GEF loan fund: Preparation of energy audits and feasibility studies for municipality owned buildings,
    Total budget: 1,5 million USD, max. 16,000 per applicant
  - Investment grants (Structural Funds): 30-40% of the total investment cost, total budget for 2005-2006: 3M €
- IFC
  - First loss guarantee for commercial loans of energy projects (up to 500,000 USD)
  - Technical assistance for project development (Feasibility study, etc.)
  - Also for small projects in portfolio
  - Until the end of 2006

GREENERGY

SWOT on ESCOs

- Most of the companies are financially strong,
- Contractors, end users understand the benefits of the ESCO services,
- Still more information-dissemination is needed,
- Most market players are not interested in the most efficient and the cheapest solution,
- It's not clear, if Public procurement is compulsory at municipality projects,
- Public procurement procedure is very difficult,
- Long term National strategy on energy policy is not adopted.

GREENERGY

Present situation - Future trends

ESCOs find the market well developed, but

- Main part of the market (district heating) is already saturated,
- Discussion on simplification the Public procurement procedure is needed,
- More focus on renewables.

GREENERGY

THE CASE OF GREENERGY

WE PROVIDE ALTERNATIVE ENERGY

GREENERGY

Greenergy business fields

**WE CREATE POWER PLANTS
TO PROVIDE SUSTANIABLE ENERGY**

Renewable Energy projects

- Wind power
- Biomass
- Geothermal

Decentralised Energy projects

- Co- and trigeneration Systems

GREENERGY

GREENERGY DUTIES

- **Development**
  - Site Selection
  - Research & Feasibility studies
  - Detailed Assessment
  - Planning Application
  - Project financing
- **Construction**
  - Main contracting
- **Operation**
  - Operation incl. service and maintenance

GREENERGY

The Greenergy business model I.

- We don't sell / lease the equipment
- Every project is owned by a Special Purpose Company
- Finance typically: 20 % equity - 80% bank loan
- Heat sold to partners
- Electricity sold to partners, or/rest to public network

GREENERGY

The Greenergy business model II.

- Partner don't have to invest anything
- Long term contract (10-15 years) on heat and electricity
- Partner will have the heat energy price 20-50% lower, power 5-10% lower
- We finance all project development costs (audit, planning, permitting, etc.)
- Partner has income from renting the area
- We operate the plant (additional savings)
- We keep former system as a reserve

GREENERGY

The IKEA project

3 gas engines

Total capacity:

3.9 MWe
4.3 MWt

Total investment:

€ 3.4 million + VAT

20% equity
80% long-term loan
(seven years)

Industrial hot water, heating, air conditioning for a furniture manufacturer

Also for other consumers around.

GREENERGY

Hotel Eger Park Project

2 gas engines

Total capacity

1,6 MWe
1,9 MWt

Total investment
€ 2.2 M + VAT

20% equity
80% long-term loan
(seven years)

Heating, air conditioning and electricity supply
250 rooms hotel, conference and wellness centre in the historical old town of Eger

GREENERGY

Coca-Cola Project

3 gas engines

Total capacity

9.123 Mwe
8,019 MWt

Total investment

€ 8.540 + VAT

15% equity

85% long-term loan
(seven years)

Industrial hot water & cool water

Heating & air conditioning

GREENERGY

Renewable energy - biogas

Problems to be solved:

- Animal manure management on large farms according to EU regulations
- Reduction of Greenhouse gas emissions (Kyoto protocol)
- Increasing renewable power production (2004-2010: by 700%)
- Alternative income generation in rural areas

The Jászberény project

Total capacity

625 kWe
702 kWt

Total investment
€ 3,7 M + VAT

40.000 ts of row material:

Animal manure
Animal by-product

GREENERGY

Thank you very much for your kind attention

Rodics Gergely

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www.greenergy.hu

GREENERGY

ENERGIAsäästu büroo

ESCO in Estonia: Market, Projects, Barriers

Jaan Tepp, *MSc.*
CEO
Energy Saving Bureau (ESB)
www.energiaaudit.ee

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

MARKET FIGURES:

- Estonian housing sector consumes annually 16,6 PJ of heat energy
- Total heat consumption by all sector categories is 31,2 PJ
- In Tallinn the annual heat consumption is appr. 2200 GWh
- The average price for heat in district heating system is 442 EEK/MWh
- At saving potential of 20-30%, the whole energy efficiency market size is appr. 1,3 TWh annually
- In terms of a finances, savings can reach 0,6 billion EEK (38 million EUR) annually

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

MARKET FIGURES - 2

- IFC survey 2003 of investment needs for EE
  - industrial sector: 380 million EUR
  - housing sector: 60 million EUR (in order to get 2,5 TWh savings)
  - public sector: 50 million EUR
- Total Estonian housing sector:
  - 36 million square meters
  - Tallinn: 10 million square meters

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

FINANCIAL OPTIONS:

Refurbishment grant is available:

- Purpose: to preserve the existing housing stock.
- Target group: apartment unions, apartment owners' associations, housing unions

Description of activity:

- The state supports repair work related to the reconstruction and restoration of the main structures of pre-1990 apartment buildings, and work to restore the electrical and gas system – 10% of the cost
- Conducting energy audits – 50 % of the cost
- Implementer: Estonian Credit and Export Guarantee Fund KredEx

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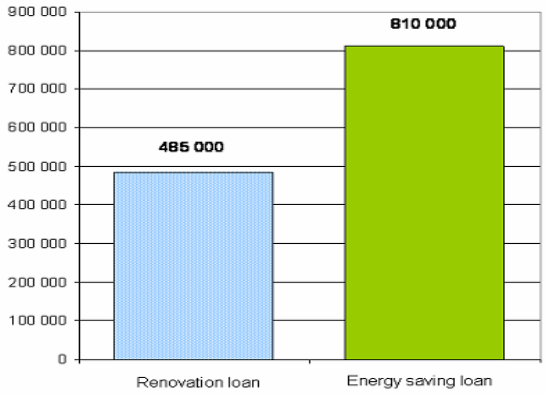
THIRD PARTY FINANCING



- Two Estonian commercial banks (Hansapank, SEB-Ühispank) are offering a special energy saving loan for apartment buildings, where upon guaranteed saving credits the loan can be expanded for amount of 10 y. energy savings

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

ENERGY SERVICE COMPANIES (ESCO-s)

- Several ESPC companies are active at offering EE consultancies and energy audits
- No strong demand side ESCO-s are currently on market for providing :
  - financing
  - project management
  - shared savings performance contracting
  - HVAC technology and energy monitoring
- But good platform for well qualified consortium based on local active companies still exists
- Financial institutions are willing to invest for building refurbishment and to provide the TPF
- Energy audits are offered by several trained auditors

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

EE ACTIONS:

- 1997 - Energy consumption research group in Tallinn Technical University
- 1999 - Co-operation with OPET and BASREC
- 1999 - Study "Investigation and Renovation of Apartment Buildings in Tartu" (Archimedes)
- 2001 - Handbook on EE in building
- 2001 - Estonia joined SAVE programme
- 2002 - First energy auditing training course- 28 persons (A/S Ramboll, DEA, DIT)
- 2003 – 10 pilot audits for schools and kindergartens

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

EE ACTIONS -2:

- 2003 – Creation of Energy Saving Bureau – ESB
- 2003 – IFC and Estonian Housing Association's joint energy auditing project KERK-25
- 2004 - PHARE energy efficiency programme for municipalities
- 2004 – Energy efficiency information portal
- 2005 - IFC and Estonian Housing Association's joint energy auditing project KERK-100

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

ESB PROJECTS:

- Energy audits (over 150 audits)
- Infrared surveillance (over 150 reports)
- Project management (several in action)
  - Cost-benefit analysis (potential energy saving, optimal bank loan, refurbishment cost)
  - Refurbishment plan (detail plan for construction according energy saving concept and optimal bank loan)
  - Financing management (negotiations with financing institutions and attraction of additional funds)
  - Procurement procedure (negotiations with construction companies, technology providers)
  - Supervising the refurbishment procedure (avoiding construction defects)

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

ESB PROJECTS -2:

- ESB is working on ESCO demo-project in Arte High School for installation of HVAC equipment with distance energy monitoring system alongside with whole EPC package (audit, ESG, IPMVP, TPF financing)
- The guaranteed savings model contract based on TPF has translated to Estonian, legal harmonization in process

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

ENERGIAsäästu büroo

MARKET BARRIERS:

- Conformity between Estonian performance indicators are missing (reference values and key numbers that based on Estonian building codes and climatic data)
- Energy audits done by different local experts are showing too high variations in estimated energy savings due to lack of suitable and harmonized methods and tools
- Most of the orders for energy audits and other EE services are conducted by external aspects (as prerequisite for better bank loan/EU funds etc), but not by internal understanding of usfulness of EE measures by building managers

ENERGIAsäästu büroo

MARKET BARRIERS - 2:

- High cost of HVAC installations and energy monitoring systems and low motivation of facility managers to invest because of investment risks
- Classical shared savings system does not work because of legislative shortcomings, heating companies are not willing to invest to EE measures
- High technical complexity of EPC, IPMVP (relevant texsts are not translated yet)

ENERGIAsäästu büroo

SOME STICKS OF DYNAMITE FOR PATH CLEARANCE:

- More publicity for requirements of EPB directive
- Faster governmental implementation of energy labelling system for buildings and EE policies that are stated in Long Term Energy and Fuel Sector Development Plan and National Energy Efficiency Target Program
- Wider promotion of EE measures and Clear Contracting techniques among building managers
- Launching a first successful ESCO demonstration project including the EPC and IPMVP
- Pooling of buildings to prepare the larger scale EE project for financing institutions (one management, one guarantee, one financing, fair opportunity for CO2 emission trade etc.)

Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

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THANK YOU FOR YOUR ATTENTION!

Energy Saving Bureau
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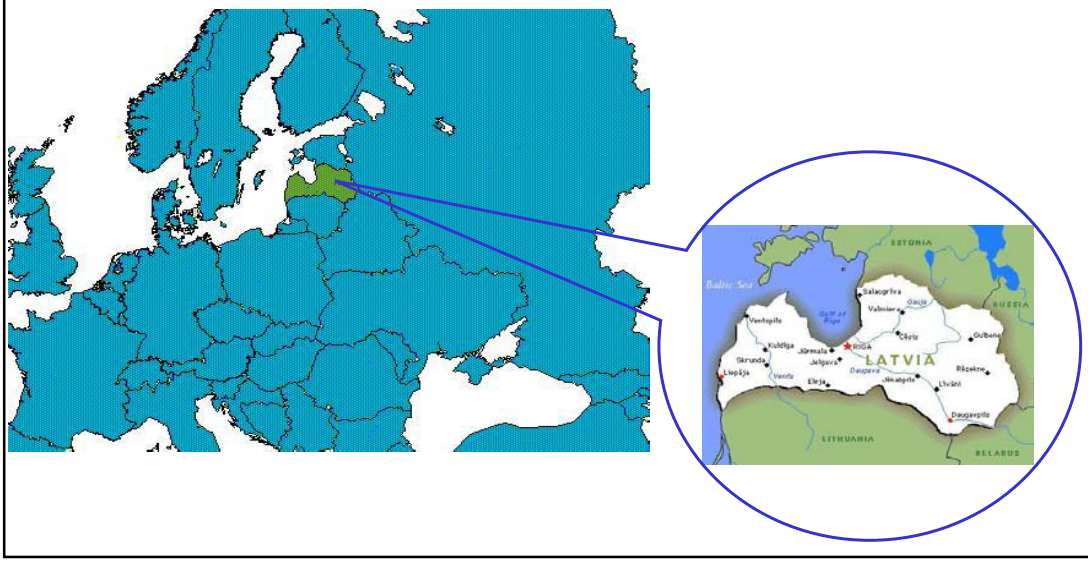
Workshop: Energy Efficiency...
Tallinn, 6-8 July 2005

Analysis of Experience of ESCO Efficient Street Lighting Project

Claudio Rochas
Ekodoma, Ltd.
Dagnija Blumberga
Riga Technical University

Tallinn, July 2005

Background



Efficient Lighting Initiative (ELI)

ELI is a programme designed by the International Finance Corporation (**IFC**) and funded by the Global Environment Facility (**GEF**)

Goals

- To decrease effect to climate changes by reduction GHG emissions
- To affect market transformation and to accelerate the growth of markets for all efficient lighting technologies

ELI in Latvia

- General coordinator: Danish Power Consultant
- Latvian program leader: Ekodoma,Ltd
- Period: March 2000 - October 2003

Ekodoma Team →

ELI Activities

- Facilitating the development of efficient lighting standards and norms
- Conducting a public education program
- Organizing CFL campaigns within the residential sector
- Developing efficient **street lighting** projects in municipalities
- Creating lighting **ESCO**s.

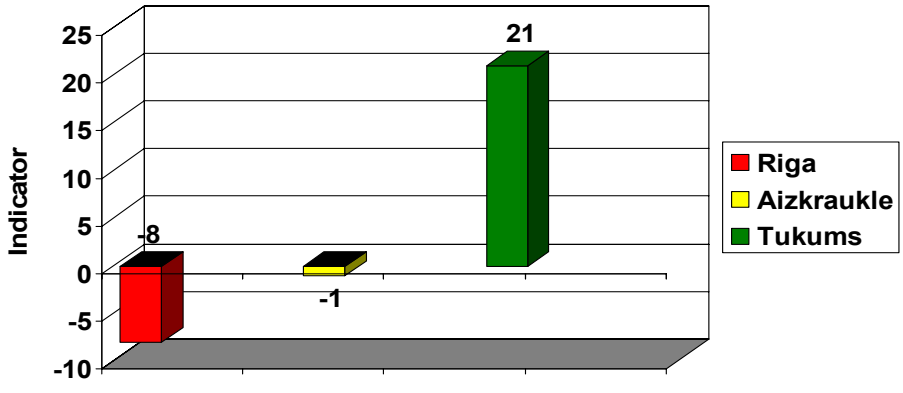
Street lighting

Efficient lighting in Tukums

Scanning methodology

- Criteria:
  - Human factor (5 points)
  - Potential savings (4 points)
  - Engineering possibilities (4 points)
  - Means of finance (3 points)
- Then, each criteria can get different marks:
  - Excellent +2
  - Good +1
  - Satisfactory -1
  - Poor -2

Project scanning



During ELI, three projects were scanned using this methodology

Barriers

- Lack of information about efficient lighting
- No experience with ESCO
- Inadequate financing
- Lack of lighting energy auditors
- Split of incentives for energy savings

Stages for street lighting project

About Tukums project

Located in Kurzeme region
~ 65 km from Riga

19000 inhabitants

Existing situation

- Use of old shape luminaries with DRL bulbs: 250 - 400W
- Use of street lighting: 1500 - 2900 hours/year (instead of 3766 hours/year)
- Installed capacity 320kW
- Yearly energy consumption ~ 896 000kWh
- Street lighting systems in municipalities were built 20 - 40 years ago

Existing situation

Tukums project

- Feasibility study and street lighting energy audit (ELI team + Danish consultant + Tukums municipality)
  - 5 alternatives proposed (max and min as well as mixture)
- Selection of alternative (decision of Tukums Council)
- Business plan (ELI team)
- Call for tender including all technical specifications
- Assistance during for tender evaluation and contract negotiation

RĪGA sia EKODOMA

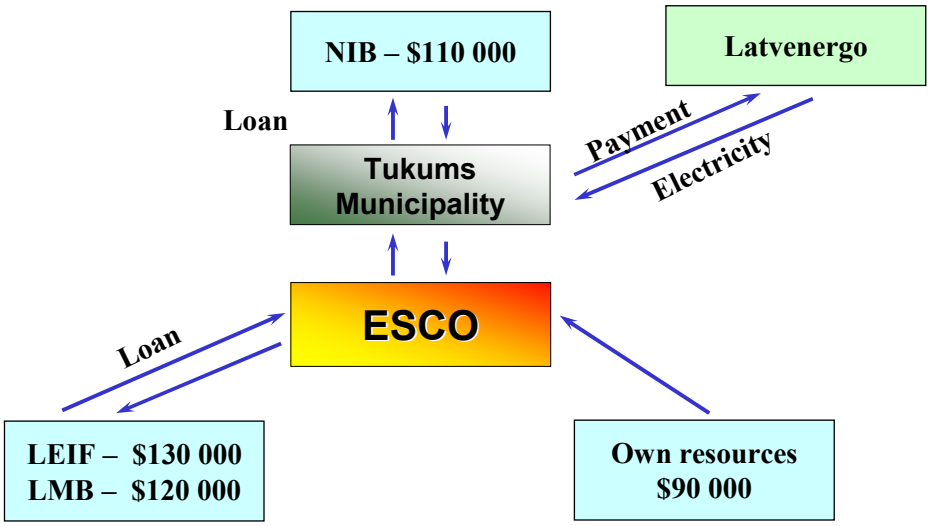
Investments – $ 450 000

- Tukums municipality
  - Nordic Investment Bank (NIB) $ 110 000 US
- ESCO - Wesseman
  - LEIF $ 130 000 US
  - Latvian Mortgage Bank (LMB) $ 120 000 US
  - Wesseman,Ltd. (ESCO) $ 90 000 US

LEIF: Latvian Environmental Investment Fund

RĪGA sia EKODOMA

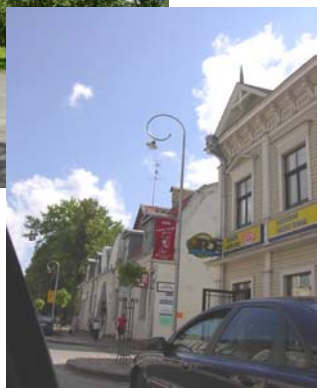
ESCO Scheme



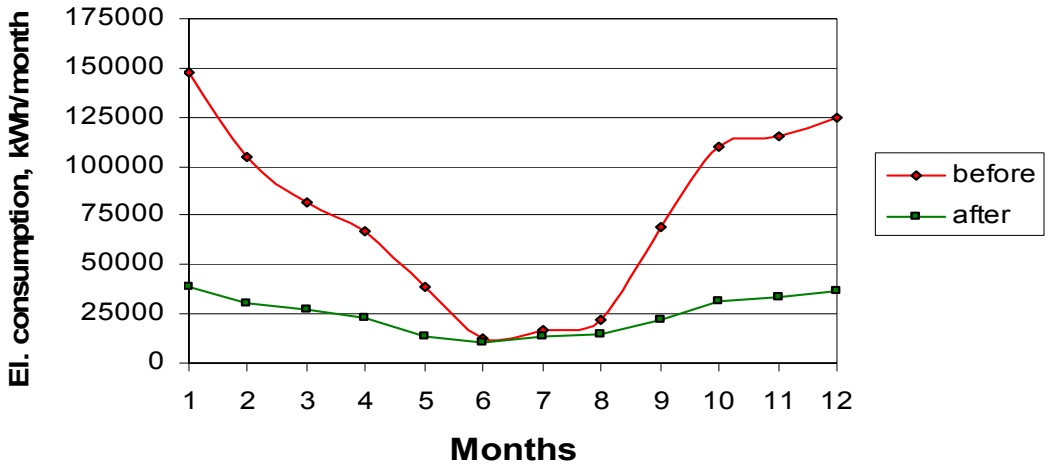
Tukums project

- Replacement of luminaries (970 light points)
- Reconstruction and new street lighting system (2,8 km)
- Total installed capacity reduced to 89kW
- Energy savings ~ 630 000 kWh/year (~41000 US$/year)
- Savings on maintenance ~ 15000 US$/year
- CO_2 emission reduction ~ 365 t CO2/year

After project implementation


Project performance



Analysis. Lessons Learned

- Capacity building is an essential step, both at ESCO and municipal level.
- There is need to put big effort with the municipal staff, including politicians and the municipality has to be open for energy efficiency
- The representatives of potential ESCOs have to understand street lighting problems both in concept and in detail
- Banks must understand the basics of street lighting energy efficiency.

Conclusion

The project is a model for small and medium-sized municipalities in Latvia and the other Baltic states.

Potential clients and ESCOs had to be convinced by a demo project.

Thank you for the attention
Claudio Rochas

"ESCO in Czech Republic: Projects, Market, Barriers"

History

1993 –	first information to EPC on Czech market
1994-1995	great start of first ESCO – 3 MIO EUR projects for public healthcare
1996-2000	many obstacles and hurdless by tendering procedure for public sector
	contemporary development of EPC for privat industry
	more ESCO was established
2001	Breakpoint in legal circumstances – new state law about state budget,
	Energy audits are processed and create description for basic raquirements of clients
	Start of activity on municipality and state level.

1

"ESCO in Czech Republic: Projects, Market, Barriers"

Barriers/conditions

Distrust of management/education related to energy efficiency and EPC

Lack of information about buildings/obligations of energy efficiency of buildings description best way by law(EA)

Legal conditions/creation of methodology of public tenders and guarancees for privat investment

2

"ESCO in Czech Republic: Projects, Market, Barriers"

Market

Critical mass must be achieved in public sector:

Education sector – managed by diferent level of municipalities

create plenty of projects but small volume.

There is very important courage of middle size cities to open public tender for tenth of buildings

Big cities have a problem with administration of procedure, small with sufficient volume.

Healthcare sector – create a good size and volume of projects.

Military, interior things,..- there is to much aditional conditions(mainly legal) and obstacles, but very high potential for EPC

Privat sector is on good track

3

"ESCO in Czech Republic: Projects, Market, Barriers"

Projects

List of projects by CEA

4

ESCO in Romania
Maket, Projects, Barriers

Florin POP
EnergoEco

EnergoEco

Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries
Tallinn, 6-8 July 2005

Presentation Agenda

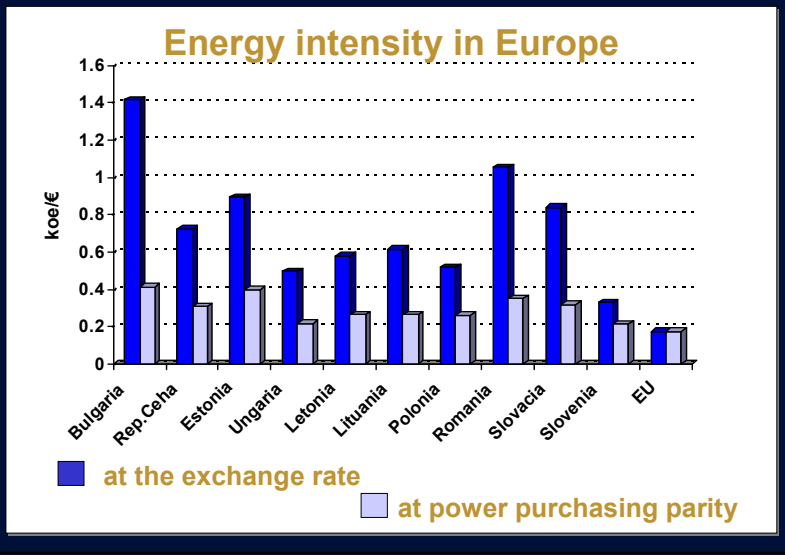
1. **National Strategy in Energy Efficiency in Romania**
2. **Case Studies**
3. **ESCO concept in Romania - Barriers**

EnergoEco

National Strategy in Energy Efficiency in Romania

EnergoEco

National Strategy in Energy Efficiency in Romania



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Florin POP, EnergoEco, Romania

National Strategy in Energy Efficiency in Romania

- The decrease of primary intensity for 2004-2015 period, with 40% compared to 2001 (basic scenario)
- 15% is achieved without taking any special energy efficiency measures
- 25% shoud result from Energy Efficiency project
- The estimated financial effort is of 2.7 billion Euro

EnergoEco

Case Studies

EnergoEco

Case Study 1

Heating and Conditionning System Modernization for an industrial hall

Proposed solutions:

- constructive rehabilitation of the roof and proper thermal insulation
- constructive rehabilitation of the exterior walls (polystiren insulation)
- rehabilitation of luminators on the roof
- thermal rehabilitation of windows and access doors

EnergoEco

Case Study 1

Heating and Conditionning System Modernization for an industrial hall

Total investment costs:

- 230 thousands Euro
- in the optimum situation, IRR = 23%
- energy savings: 25%

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Case Study 2

Heating System Modernization for an industrial customer

Proposed solutions:

- realizing space heating by a radiant tubes' system
- eliminating the electric boiler for producing overheated warm water (used for industrial process) and setting an automated gas boiler

EnergoEco

Case Study 2

Heating System Modernization for an industrial customer

Total investment costs:

- 70 thousands Euro
- in the optimum situation, IRR = 48%
- energy savings: 35%

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ESCO concept in Romania

EnergoEco

ESCO concept in Romania - Bariers

- Lack of an adapted legal framework (Law indicates what must not be done instead of what can be done)
- Lack of information and awareness by clients ("thank your for comming, no bank would give us a loan")
- Lack of adapted financing sources
- Lack of intermediaries

EnergoEco

ESCO concept in Romania

- EnergoEco is currently realizing a Market Study upon possible Energy Efficiency project among the 500 most important energy consumers in Romania
- Partial conclusions: the estimations made in the National Strategy in Energy Efficiency (energy consumption reduction potential of 25%; financial effort of 2.7 billion Euro) are very realistic

EnergoEco

THANK YOU
FOR YOUR ATTENTION

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www.energobit.com

EnergoEco

Company for Energy Saving JSCo.

KEC

Energy Performance Contracting in Eastern Europe

ESCO in Bulgaria: Projects, Market, Barriers

Dimitar Zahariev
Company for Energy Saving JSCo.

„Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member Statess and Candidate Countries"
Tallinn, Estonia, 7 July 2005

Partner of Stadtwerke Leipzig

RWE GROUP

Company for Energy Saving JSCo.

KEC

I. INTRODUCTION OF COMPANY FOR ENERGY SAVING JSCo (CES)

- **CES JSCo.** was founded in May 2001 in Sofia, Bulgaria.
- **Shareholders**
  - **RWE** Industrie-Losungen GmbH – 55% shares
  - **SWL** (Stadtwerke Leipzig GmbH) – 45% shares
- **Field of activities**
  - **ESCO projects**
  - **Consultancy and Engineering Services**
  - **Energy Audits**
  - **Energy efficiency solutions**
  - **Renewable energy sources**
- **Registered Capital Stock - 550 000 €**
- **Personnel - 30 employees**
- **Rented Office Space ~ 625 m²**
- **30 PCs, LAN, Remote Control Center, 8 service cars.**

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II. LEGISLATION FRAME

Directive № 2002 / 91 / EC-16 Dec 2002
of European Parliament & Council of Europe
on Energy Characteristics of Buildings:

Art. 6: Existing Buildings:

"Member - countries will take necessary measures to insure that buildings with total useful floor area over 1000 m^2 undergo major renovation, their energy performance is upgraded in order to meet minimum requirements in so far as this is technically, functionally and economically feasible."

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Legal Environment

- Energy Efficiency Law and supplementary Regulations listed below;
- Energy Law;
- Law for Development of the Territory;
- Environmental Law;
- Law for the National Standardization;
- Law of State Budget;
- Law of State and Municipal Property;
- Public Procurement Law, etc.

- Regulation No. 18 / 2004 for the energy characteristic of the buildings;
- Regulation No. 21 / 2004 for energy efficiency audits;
- Regulation No. 19 / 2004 for certification of buildings for energy efficiency;
- Regulation No. 7 / 2004 for heat saving and economy of energy in buildings;

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III. TEMOS Project in Sofia
(Thermal Energy Management in Municipal Buildings)

1. Project characteristics

- **First ESCO Contract in Bulgaria**
  Signed on 26th July 2002 for 7 years in accordance with the procedures of the Law for Public Procurement.
- **Scope**
  Over than **309**, centralize heated, public buildings of different types and function:
  - schools,
  - kinder gardens,
  - nursery schools,
  - hospitals,
  - administrative buildings.

  The buildings are situated in the City of Sofia and belong to the Sofia Municipality. This is one of the biggest ESCO projects in Europe concerning the number of buildings included in a single contract.
- **Aim**
  Reduction of heat energy consumption for heating of the buildings. Achieving 35% of energy savings, keeping the normative comfort for the users.

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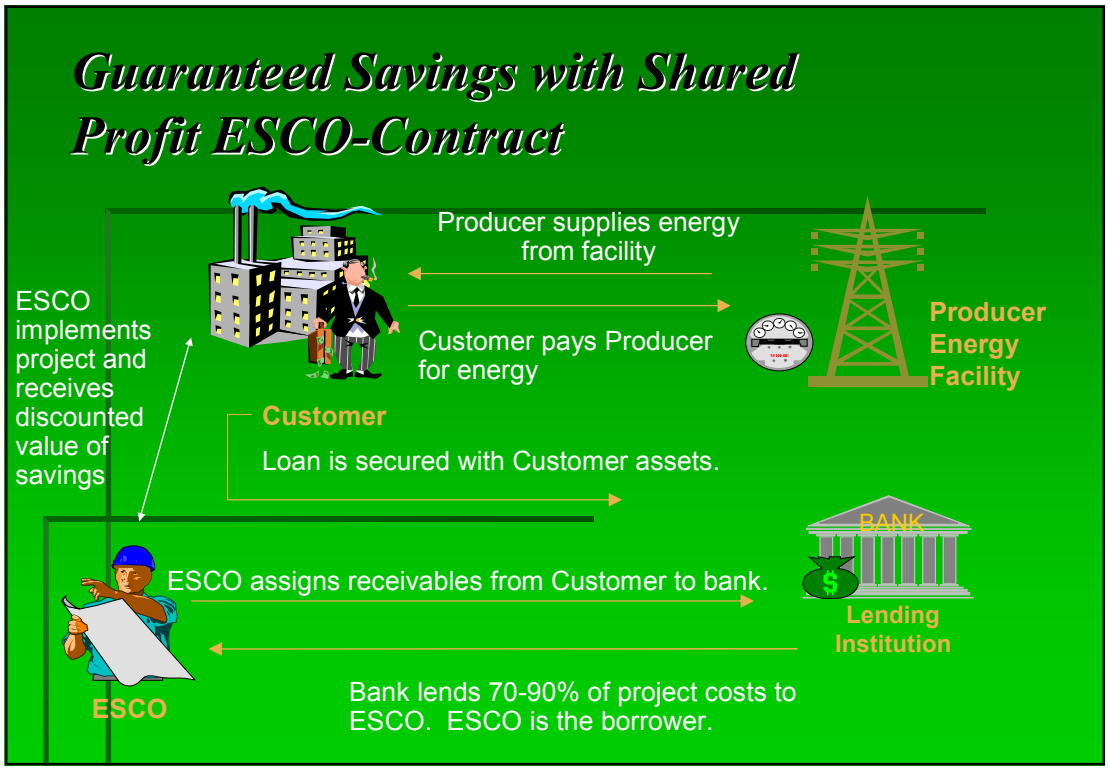
- **Our approach**

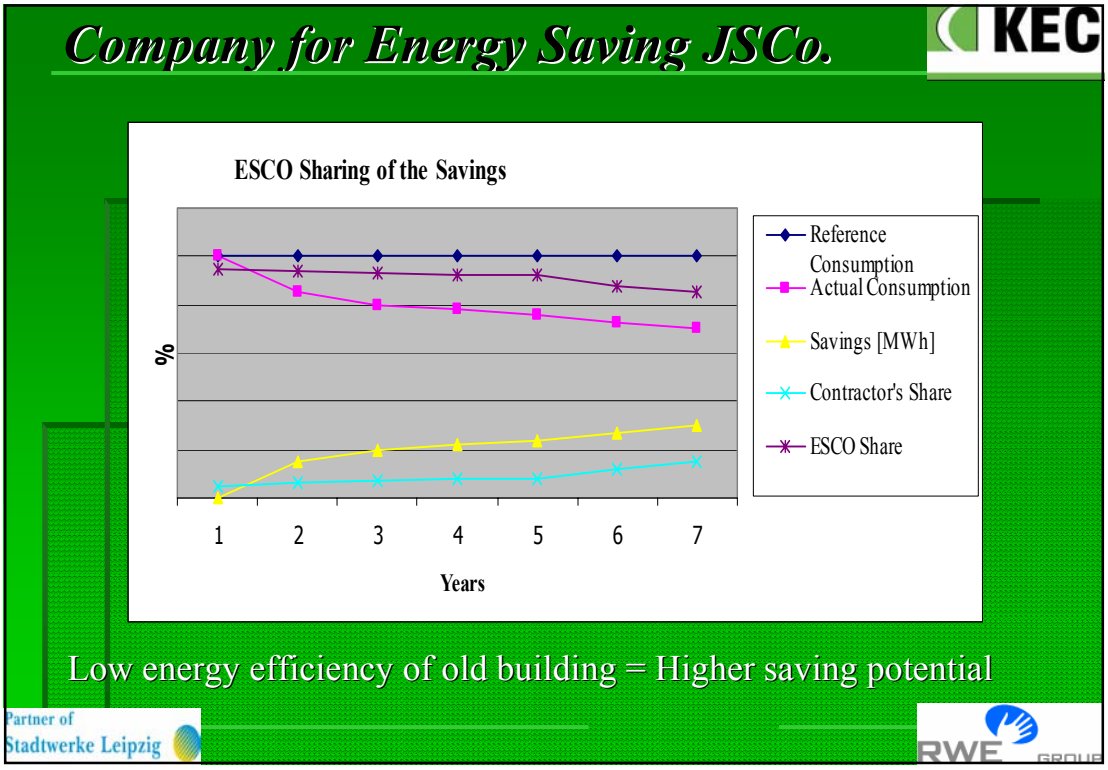
A. Implementation of energy saving measures (ESM):

- sealing of the windows in the buildings;
- replacement of the old radiator valves with new thermostatic valves;
- installation of reflection foil behind the radiators;
- replacement of the old substations with new substation equipment;
- rehabilitation of the equipment of some of the old substations;
- installation of equipment for measurement and control of the heat energy consumption;
- installation of equipment for remote control and adjustment of energy saving regimes of the heating system;
- Remote Control Center (RCC), covering 50 buildings, another 50 buildings - forthcoming.

B. Energy management:

- permanent measurement, control and adjustment of equipment on site;
- remote measurement, control and adjustment (50 buildings covered);
- buildings staff education program, education materials dissemination, 'TEMOS' news bulletin, bonus system for the users of the buildings for achieved high savings, etc.


Guaranteed Savings with Shared Profit ESCO-Contract
Producer supplies energy from facility
Customer pays Producer for energy
Producer Energy Facility
ESCO implements project and receives discounted value of savings
Customer
Loan is secured with Customer assets.
BANK
ESCO assigns receivables from Customer to bank.
Lending Institution
ESCO
Bank lends 70-90% of project costs to ESCO. ESCO is the borrower.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ESCO Sharing of the Savings
%
Years
1
2
3
4
5
6
7
Reference Consumption
Actual Consumption
Savings [MWh]
Contractor's Share
ESCO Share
Low energy efficiency of old building = Higher saving potential
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Goals of TEMOS project

- Guaranteed savings of energy for heating and domestic hot water;
- Decrease of the heat energy expenses;
- Improve the quality of heat supply;
- Assure the normative comfort of the users;
- Stimulate energy saving behavior of the users;
- Reduction of GHG emissions.

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Achievements of TEMOS Project - Energy Savings

- 29 GWh_{th} saved for season 2002/2003
- 43 GWh_{th} saved for season 2003/2004 (growth of 48 %)
- 49 GWh_{th} saved for season 2004/2005 (growth of 14 %)

Unconditional energy saving measures completed

Thermostatic valves	– 100 % of the buildings
Reflection foil behind the radiators	– 100 %
Windows sealing	– 100 %
Substations	– 100 %
Remote Control System	– 15 %

Total Investment Cost ~ 3,846 T €

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Environmental benefits

Achieved reduction of the the CO_2 emissions:

2002/2003	**- 7 883 t CO2**
2003/2004	**- 12 089 t CO2**
2004/2005	**- 13 463 t CO2**
TOTAL expected CO_2 reduction	**- 79 170 t CO2**

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IV. Market for Energy Efficiency Services in Bulgaria

Bulgaria energy efficiency building stock:

- 8,000 state-owned & municipal buildings (hospitals, schools, administrative buildings, etc)
- 684,676 private households. Long term program for rehabilitation until year 2020 with support by the **Government subsidy of 425 mln. EURO.**
- **Financial IRR – up to 25%**
- **Expected reduction of GHG emissions up to Year 2020 – 35 million t CO_2**

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Bulgaria energy intensity

- The energy intensity in Bulgaria is twice more than the average value for the EU.
- Electricity intensity towards the GDP is seven times higher than the OECD (Organization for economic cooperation and development), four times higher than in Hungary and Turkey, and 60% higher than in Romania.
- Saving potential is up to 50% for the existing building stock, about 40% for district heating and 30% for the industry.

Certification of buildings

- All public buildings with size above 1000 m^2 are compulsory subject of Energy Audit in accordance with local legislation.
- Certification of buildings (Certificate "class A" – 10 years property tax free; Certificate "class B" – 5 years property tax free).
- The Energy Audits and Certification of Buildings within Bulgaria is executed by licensed companies.

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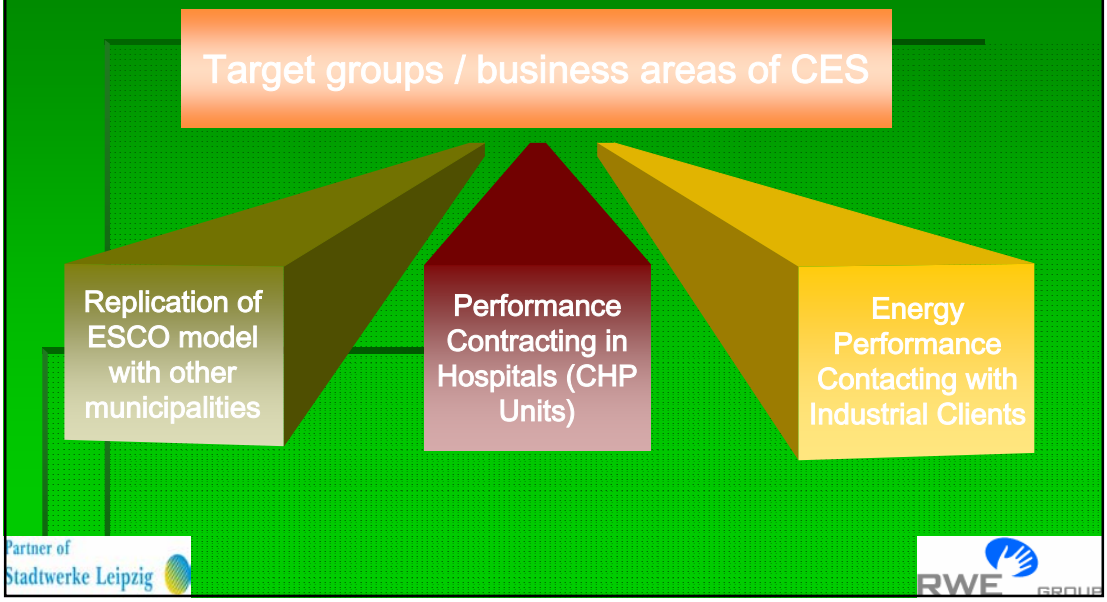

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V. Barriers to the intensive development of Energy Efficiency Services

- Legal basis (transfer of ownership of the installed equipment).
- Under-heated buildings (inroom temperatures below the requirements for normative comfort).
- Slow proceeding, non-cooperation, delay of payments.
- Complication and changes in the administrative structure.
- Understanding of the ESCO concept. The buildings owner is paying part of the achieved ENERGY SAVING only but not the investments.
- Seasonal character of the heat consumption (and payments).
- Lack of reliable consumption data and baseline definition.
- Lack of motivation for energy saving by the end users.

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Company for Energy Saving JSCo.

Thank you

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SESSION 5:

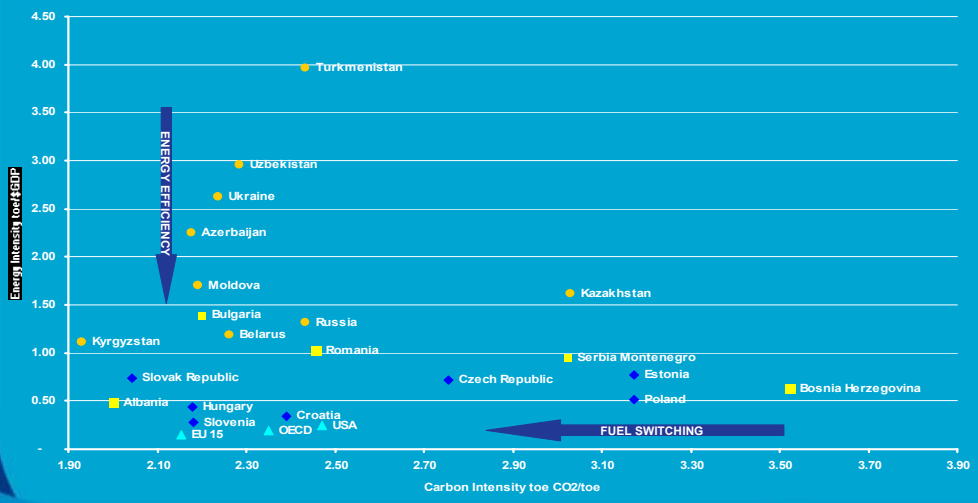
FINANCING OF ENERGY EFFICIENCY PROJECTS

Financing Energy Efficiency in NMS and Accession Countries

TAIEX – JRC, Tallinn 8 July 2005

www.ebrd.com

The opportunity is compelling



Data source: IEA (www.iea.org/Textbase/stats/index.asp)
Ref. year: 2002

www.ebrd.com

Jaquelin LIGOT, EBRD

The case for Energy Efficiency

- Higher fossil fuel prices, tariff rises and re-balancing:
  - Waste is becoming more costly
- EU environmental regulations:
  - Directives on buildings, energy services, IPPC, etc.
  - Emission Trading Scheme; carbon has a price!
  - New EC "Green paper on EE"
- Intensified international competition as trade increases:
  - Cut costs and enhance cash flow
- Security of supply:
  - Most CEE countries reliant on fossil fuel imports
  - Closure of unsafe NPPs: e.g. Kozloduy

www.ebrd.com

Energy Efficiency: Strategy

- Dedicated energy efficiency team
- Main approaches:
  - Systematically pursuing EE opportunities in industrial projects
  - Making energy supply systems more efficient
  - Supporting providers of EE services, e.g. ESCOs
  - Reaching out to small projects through local financial intermediaries, e.g. credit lines
  - Promoting Carbon Finance as a co-financing source

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Industrial Energy Efficiency: Approach

Goal is to optimise EE component in all relevant Bank operations:

- Screen all projects at concept stage and identify those with EE potential – ratings are given (*E0, E1, E2*)
- Provide free energy audits funded with TC funds
- Structure an "add-on" to direct debt or equity financing – enhances company cash flow
- Advise on off balance sheet solutions: ESCOs, Outsourcing, Leasing energy assets
- Energy Management training modules where appropriate

www.ebrd.com

Industrial Energy Efficiency Example: TogliattiAzot (Russia) 2004

- $160mln senior corporate loan comprising a $100mln A-loan and up to $60mln B-loan
- Largest ammonia producer in FSU, approx. 7.6% of world market
- Project consists of complete revamp and modernisation of 4 production units and capacity increase
- Energy audit funded by Dutch Government

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Industrial Energy Efficiency Example: TogliattiAzot II

- ToAz consumes approximately 1% of Russia's domestic gas, largest single-site user!
- Reduce gas consumption for existing production in the revamped plants by 20% with a cost saving of up to $20mln/yr at current gas prices
- Annual gas saving (on existing production output) is approximately equal to the average monthly consumption of Switzerland
- Reduction of CO2 emissions (on existing production output) in excess of 550,000 tonCO2/yr – EBRD is structuring a JI transaction

www.ebrd.com

Poznan DH + Cogeneration Privatisation (Poland) 2003-2004

- DH company and CHP plant of Poznan were privatised consecutively by City and Polish Treasury resp. following competitive tender
- CHP plant supplies heat to Poznan DH network, and electricity with 2 off-takers (National grid operator PSE and local Disco ENEA)
- Buyer was Dalkia Int'al via its Polish subsidiary, Dalkia Polska
- EBRD invested alongside Dalkia for a total of €50 m (equity) over the two operations
- Exit via put option to Dalkia Int'al at fair market value or earlier via trade sale or listing of Dalkia Polska

www.ebrd.com

Energy Alliance (Ukraine) - 2004

- First privately-owned Ukrainian **ESCO**; Start-up company; Sponsor is Western NIS Enterprise Fund
- Focus on leasing small (1-3 MW) co-generation and electricity generation engines to industrial clients
- $10 mln EBRD loan; $5 mln syndicated to RZB
- Lease payments calculated based on current grid heat and electricity prices minus a discount
- Assets transferred to client at pay-out
- 1st Project with KOEP, a large Ukrainian edible oil extraction plant in Kirovograd oblast; constr. of a 4 MW co-generation station fuelled by sunflower seed peels (natural by-product of the client) for USD 3.0 mln

www.ebrd.com

UkrEsco (Ukraine): a Public ESCO

- **State-owned ESCO created in 1998 through an initiative between Ukraine, EBRD and the EU**
- **EBRD extended a $30 million loan to UkrEsco, secured by a sovereign guarantee**
- **UkrEsco targets industrial & commercial clients**
- **Payment to ESCO is similar to servicing a loan; is due regardless of actual savings**
- **Model for countries where perceived risks are too high**
- **Follow on loan of $20 m to be signed in Q4 2005**

www.ebrd.com

Industrial Energy Outsourcing: Hungary

- Joint project BERt (EDF) - Prometheus (Dalkia and EBRD)
- Kobanya CHP: 17MWe, 30MWth, total project costs: EUR 10m
- Financed by debt (2/3) and equity (1/3)
- New decree on CHP (dec. 2002) guaranteeing off-take and price until 2010 – *changes are being discussed in Parliament (June 2005)*
- Electricity sold to ELMU – 117 GWh per year
- 6 industrial clients for steam (including Richter, Alpharma, Ceva, Metro) – 640TJ per year
- EBRD contributed to equity portion via a capital increase of Prometheus

www.ebrd.com

City of Łódz (Poland): ESCO for public sector facilities

- Bank initiated and supported project development with TC funds for preliminary assessment & preparation of tender
- Scope: Circa 420 municipal buildings (mostly schools and kindergarten); largest single ESCO contract in the region
- ESCO to be selected through int'al tender. Short-list of 4 firms. Only Siemens BT bid. City will re-start tender
- EBRD could provide loan or payment guarantee to ESCO on a limited recourse basis; or buy receivables (forfeiting) or share risk with forfeiting bank

www.ebrd.com

Dedicated Equity Fund: Dexia-FondElec

- Euro 71 mln equity fund (March 2000), focused exclusively on energy efficiency investments in EBRD's countries of operation
- EBRD invested €20 mln -- 28%
- 100%-owned ESCO (EETEK) acts as investment vehicle
- Investments include:
  - Capitalisation and modernisation of 2 Polish district heating facilities into CHP plants
  - Energy outsourcing project with major Hungarian manufacturer - RABA
  - Installation of small co-generation engines for industrial clients, e.g., hospitals, chemical plants
  - Street lighting project with group of municipalities
- Potential for enhanced returns from sale of carbon credits

www.ebrd.com

Bulgaria Credit Line #1: Industrial EE and Renewable Energy - 2004

- €50mln EBRD credit line framework with Bulgarian banks for on-lending to private sector for **industrial energy efficiency** and **small renewable energy projects**.
- €10mln grant from Kozloduy International Decommissioning Support Fund for:
  - Cash incentives to local banks and sub-borrowers (80%)
  - and a technical assistance package: project preparation and project validation (20%)
- 6 loans signed in 2004 for the full €50 mln amount
- 22 projects already approved

www.ebrd.com

Bulgaria Credit Line #2: Residential Sector - 2005

- €50 mln EBRD Credit Line Framework with Bulgarian banks for on-lending to individuals for EE investments in residential sector
- 35% of Bulgaria's energy saving potential, owing to poor insulation of dwellings and overuse of electricity
- i) insulation ii) biomass efficient heaters/boilers, iii) solar water heaters, iv) efficient gas boilers
- Average rebate of 20% of the investment cost
- Potential borrowers 250,000 households - budget sized for circa 30,000 Sub-loans
- €10 mln grant from Kozloduy Decommissioning Fund
  - Preparation/ Marketing/Verification: € 0.7 million
  - Incentives to sub-borrowers and Participating Banks and : €9.3 million
- 3 loans signed as of 30 June 2005

www.ebrd.com

Carbon Finance: a project example

- Paper Factory Stambolijski: pulp & paper mill in Bulgaria
- Investment of up to €12 mln in waste (bark) boiler & EE
- energy costs reduction (annual savings estimated at €3.6 mln)
- 600,000 tons of CO2 reduction 2006 – 2012 – 50% advanc payment
- Buyer is EBRD for the account of the Netherlands, from Joint Implementation projects which EBRD finances
- Netherlands JI Carbon Fund: EUR 32 million

www.ebrd.com

Characteristics of EBRD's approach

- Public or private clients
- Variety of instruments: stand-alone debt or equity; indirect via equity funds or credit lines
- Risk appetite: limited recourse to parent company; start-ups; high ratio of debt to equity; high % of project costs
- Ability to mobilise and use grant funding: Bulgaria, Lodz, etc.
- Ability to engage host Governments
- Stand-alone from €10m in project costs; if below: equity fund or credit line are best suited
- Carbon finance: e.g. UBB (Bulgaria)
- As quick as…the client allows
- Market-related pricing reflecting risk

www.ebrd.com

Annex 1 - Transition Milestones (I)

1/ Structure and extent of markets

- Development of a market for energy efficiency and conservation, through private provision of energy audits aimed at realising substantial energy savings for large industrial users, and the introduction of a competitive ESCO market.
- Active demand-side management by energy utilities or specialised ESCOs responding to market-based price signals. Introduction of metering and billing according to actual consumption, individual temperature control, etc.

2/ Market institutions and policies

- Increase in energy prices (power, gas, heat) to cover costs and provide an efficient signal for consumption and production
- Development of a regulatory framework with a separate/independent body for enforcing energy efficiency legislation, particularly with regard to setting of prices and approving investments. Prices should be such as to encourage commercial finance of economically beneficial projects
- To support renewable projects, the legal regulatory framework requires also the adoption of dedicated support measures (e.g., feed-in tariffs, system benefit charges, renewable obligations) with a subsidy component to encourage developers of projects

www.ebrd.com

Annex 1 - Transition Milestones (II)

- Introduction of economic incentives to meet national, regional or international environmental standards (e.g., compliance with the Kyoto Protocol and EU Directives) to turn emissions reduction into a profitable opportunity (pollution taxes, carbon finance mechanisms, etc.)
- Government-sponsored initiatives and regulation to conserve energy (information campaigns, energy audits, technical standards)

3/ Market-based conduct, skills and innovation

- Introduction of energy management systems and other management measures (e.g. ISO standards, training) and other management measures to promote energy conservation in energy intensive industries
- Strong price responsiveness and implementation of modern energy saving technologies in the industrial and residential sectors
- Gradual reduction in energy use per unit of output to reach international best practice

www.ebrd.com

Annex 2 - Industrial Energy Efficiency: How it works

NOW….

- **Screening** ALL the projects going to OpsCom re EE potential: E/3= major (EET/PEU/DH sic codes); E/2=significant (energy intensive sectors); E/1=some potential (moderately energy intensive sectors); E/0=no or negligible potential (green-field and FI)
- **Tracking EE investments** of the EBRD: supporting Project Teams assessing the EE components financed through the projects, assessing physical energy savings, assessing CO2 emissions reduction and the prospects for carbon credits
- **Energy Audits Programme**: supporting existing and prospective clients addressing EE (energy audits, energy management training) and financing EE investments

… in the (NEAR-) FUTURE

- **Benchmarking** energy performances of industrial projects in less energy intensive sectors (E/1): create a database of energy performance indicators and best practices (adapted to local conditions in the COO) in selected industries (e.g., food processing, textile)

www.ebrd.com

Annex 3 - Industrial Energy Efficiency: Results (as of May 2005)

- **Screening**: in 2004 a total of 210 new projects were screened by EET. Of these 17 were E/2, 47 E/1 and 146 E/0.
- **Tracking EE investments**: €103mln industrial EE investments financed by the EBRD in 2004, realising > 320,000 toe/y and reducing CO2 emissions by >850,000 tonCO2/y
- **Energy Audits Programme**: 22 energy audits undertaken in 2.5 years, 3 energy management trainings, 10 loans signed with $183mln EE investments financed by the EBRD, additional 4 loans with EE components expected to be finalised by 3Q2005
- **Benchmarking**: TC Com approval, donor funding finalisation on-going, collaboration with Oxford University (6 months internship starting in July)

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Annex 3 - Industrial Energy Efficiency: Energy Audits Programme

- Donors: Greece (€400k), CEI (CEI countries only, €400k), Austria (ETCs only, €500k), EU-Tacis (Russia only, €500k) (As of 1 July 2005)
- Objectives:
  - Optimising EE components in all relevant Bank operations
  - Helping clients reduce their energy consumption and improving energy management practices
  - Main focus on industrial sector (especially energy intensive: steel, pulp and paper, cement, chemicals, etc.)
  - Investments in modern energy efficient technologies
  - Training and knowledge transfer
  - Assistance in identifying carbon credits opportunities
- Typically will result in an "add-on" to direct EBRD debt or equity financing – this will enhance company cash flow

www.ebrd.com

World Bank Approach to Energy Efficiency Financing – Europe and Central Asia (ECA) Region

Presentation at EC Energy Efficiency Workshop in Tallinn, July 8, 2005

EE Program Models

- Utility demand-side management (DSM)
- Market transformation
- Energy service company (ESCO) development
- EE financing
- Supply-side upgrades
- Complementary activities and technical assistance

Financial Tools

- Partial Risk Guarantees
- Loan Loss Reserve Funds
- Special Purpose EE Funds/Loans
- Investment Grants

Ongoing WB EE Projects in CEE

- Lithuania (GEF)
- Poland (IBRD and GEF)
- Croatia (IBRD and GEF)
- Romania (GEF)
- Bulgaria (GEF)
- ESMAP project in Poland

Lithuania Heat Demand Management Project

- Project launch: 2003
- $6.5 million: VE $2.5m and VCM $4.0m
- VE Component (Dalkia): Heat regulation improvements. 75% support from Effective Energy Consumption Fund. Total planned investment: $34m.
- VCM Component: Building envelope improvement through revolving fund with international fund manager

Poland EE Projects (1)

- **Krakow EE Project (launched 2002)**
- Recipient: MPEC, Krakow
- $15 million IBRD loan, of which $7.5 million for ESCO activities
- Operation of utility based ESCO (POE) as subsidiary of MPEC
- Targets public sector buildings in Malapolskie Region

Poland EE Projects (2)

- **Poland EE Project (launched spring 2005)**
- Recipient: BGK bank and POE, Krakow
- $11 million GEF Grant: $7 million for guarantee facility, $2 million for POE ESCO investments, $2 million for TA
- Work through participating banks, guarantee coverage: 50-70%
- Active pipeline development and support to energy audits.

Croatia EE project (1)

- **ESCO Component (launched spring 2004)**
- Recipient: HEP ESCO, a subsidiary of national power company
- $10 million: $5 million GEF grant and $5 million IBRD loan
- Grant supports pipeline development and revolving finance of project
- Loan finances ESCO operation
- Target sectors: public buildings and street lighting
- Promising pipeline has been developed

Croatia EE project (2)

- **Guarantee Component (will be launched fall 2005)**
- Recipient: HBOR (state owned, second tier bank)
- $2 million GEF grant: $1.2 million for partial risk guarantee and $0.8 million first loss reserve
- Parallel implementation with UNDP project
- GFAs to be signed with 3-4 commercial banks
- Guarantee coverage: 50%

Romania Energy Efficiency Fund

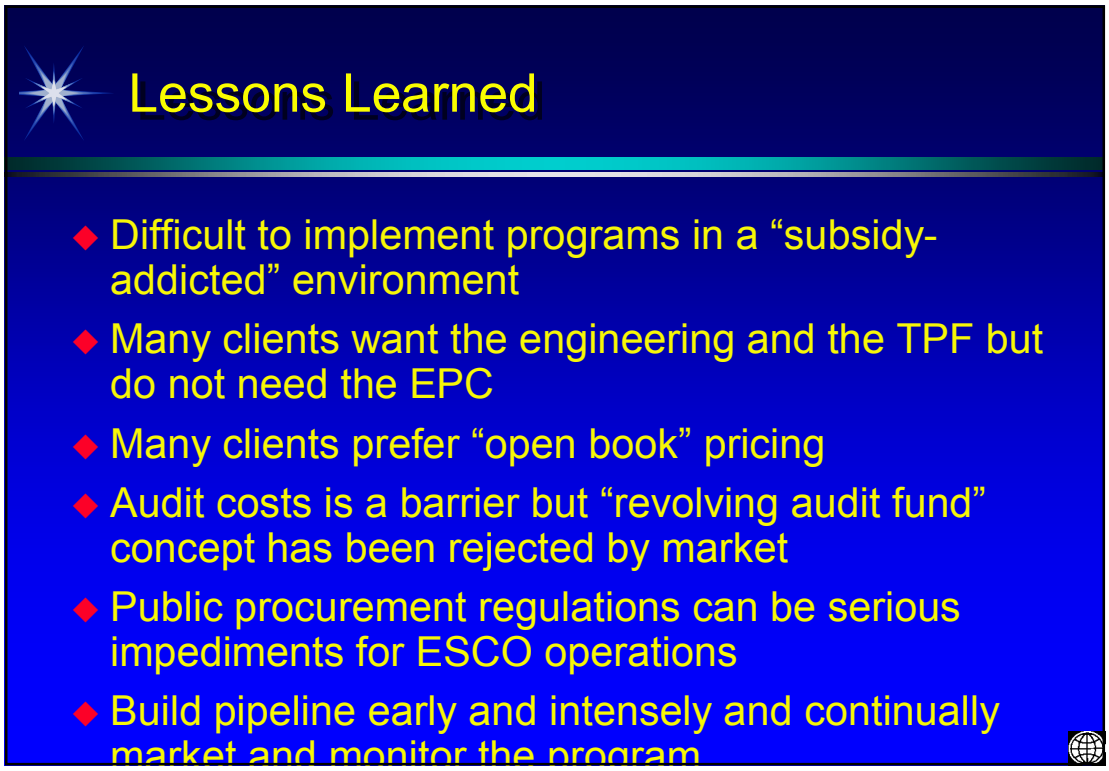
- Launched 2003
- GEF Grant of $10 million: $8m for EE investments and $2m for TA
- International Fund Manager
- Debt financing only (co-financing)
- Targets direct financing as well as TPF through ESCOs

Bulgaria Energy Efficiency Fund

- Launched Summer 2005
- GEF grant of $10 million: $4.5m partial credit guarantee, $4.0m debt financing, $1.5m TA
- Co-financed by $1.8 million from GoB and $5.75 million from bilateral donors (tbc).
- Fund will be flexible employing debt finance or guarantees as needed
- International Fund Manager

ESMAP: Innovative Financial Intermediation for Energy Efficiency

- Pilot projects in Poland and Mexico
- SPE, master lease, mezzanine finance, first loss reserve etc.
- Poland - 3 sectors targeted: residential, hospitals, municipal buildings
- Residential: renovation account scheme, DH company provide equity
- Hospitals: part Marshalek guarantee, part savings based supported by first loss reserve
- Municipal buildings: SPE or master lease


Lessons Learned
Difficult to implement programs in a "subsidy-addicted" environment
Many clients want the engineering and the TPF but do not need the EPC
Many clients prefer "open book" pricing
Audit costs is a barrier but "revolving audit fund" concept has been rejected by market
Public procurement regulations can be serious impediments for ESCO operations
Build pipeline early and intensely and continually market and monitor the program

Innovating Energy Efficiency Financing in the Housing Sector

European Investments & Partners

Adam de Sola Pool

8th July 2005

Background: Poland

- No successful ESCO type companies
  - Many attempts, all failures or very limited success
- No EU programs for 6000 + housing cooperatives
- But a Polish Gov. program to refund 25% of specialized EE loans for social structures
  - Polish Gov. Requirements Demanding:
    - Borrower needs 20% of own capital
    - Monthly debt service cannot exceed 70% of renovation fund collections
      - Housing co-ops renovation fund collected monthly €0,1 → €0,5 per m^2
    - Bonus paid when loan disbursed
- New World Bank program about to start

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Background: Social Structures

- Hospitals, Schools and Housing Co-ops need renovation throughout CE region
- 6000++ housing structures need energy efficiency modernization in Poland
  - Built in 1960's – 1980's
  - Old "Blocks" have high energy wastage
- Low demand for remediation of situation even though it can be cost effective
  - Some paybacks of < 2 years, many ≈ 5 years

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Why is Demand Lacking?

- Energy not fully priced versus W. Europe
- Civilian Requirements:
  - Co-op administrators have to show prompt results
  - Owners generally poor & do not want to pay more
  - Poor track record of successful co-op management
  - Thus a huge psychological barrier to innovation
- Need to educate owners to demand EE & other services

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Housing Co-op Challenges

- Most Co-ops lack deep financial resources
  - Typically need 2 years to accumulate down payments for modernization
- Renovation Funds often have < Euro 10 K
  - Need to triple or quadruple funds flows
- Many administrators have "old" thinking
  - Financial engineering is not key skill requirement when hired
  - Human resources thus a key to EE implementation
    - Much capacity building still to be done

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World Bank Assignment

- World Bank sponsored a program to innovate energy efficiency projects in Poland
  - Housing cooperatives & hospitals
- EIP – part of the multi-firm team
  - Responsible for innovative financial structures
- One year of extensive field research
  - Over 25 banks interviewed
  - Numerous site visits with housing cooperatives et al
- Tested & refined financial structures
  - SPVs, Master leases, Industrial guarantors etc.

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Solution is Simple Yet Complex

- Must address four constraints:
  - Energy, finance, psychology, calendar
- Create multistep investment process
  - Start with small investment & small loan (Summer)
    - Use short term bank loan to cover most profitable investment
    - 20% of 20% = 4% is all that is needed from cooperative
    - Accomplish first "small" investment
  - Collect money and repay loan
    - After 1 year first loan paid down
    - 20% of works finished from step 1
    - Use the works finished as own contribution
    - Cash collected & loan repaid thus establishes credit history
    - First results – energy savings – achieved in eyes of owners
      - Winter savings seen promptly after finishing work

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Solution is Simple Yet Complex 2

- Second Step is larger project / larger borrowing (next summer)
  - Own contribution is first project = 20%
  - Bank loan for 5-7 yrs with recent credit history
  - Refurbishment of exterior / interior communal surfaces
  - Provides comprehensive efficiency gains
  - Can be repaid through renovation account
  - Provides psychological modernization of building
    - Administration demonstrates the "success" of its activity
- Incremental steps can be replicated for even larger projects
- Computer simulation aids administrators, owners & banks

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EIP Computer Model Outputs

1. Building Inputs

Ankieta budynku

Adres:

ul.	numer		
WYZWOLENIA	29	Data sporządzenia	7-4-2005
miasto	kod		
GDAŃSK	80-537		

Parametry budynku		**Dane finansowe wspólnoty**	
Rok powstania budynku	1974	Stan środków funduszu remontowego	54 762,00 zł
Liczba kondygnacji	5	Na jaki dzień podano stan	31-12-2004
Kubatura budynku m^3	14 308	Zaliczka na fundusz remontowy za $1m^2$	0,50 zł
Powierzchnia netto budynku m^2	5 723	Suma kosztów na CO i CWU za ostatni rok wg audytu	255 146,00 zł
Powierzchnia użytkowa części mieszkaniowej m^2	5 193	Suma kosztów na CO i CWU na $1m^2$ miesięcznie	4,09 zł
Liczba mieszkań	120	Suma zaliczek pobr. na CO i CWU za ostatni rok	165 272,00 zł
Liczba mieszkańców	347	Zaliczka pobierana miesięcznie na CO i CWU na $1m^2$	2,65 zł

Planowana Termomodernizacja	Koszt	Oszczędność kosztów energii w zł	w %	Zwrot z inwestycji
I Modernizacja instalacji CO i CWU	165 000,00 zł	32 780,00 zł	13%	20%
II Izolacja stropodachu	92 625,00 zł	23 826,00 zł	9%	26%
III Izolacja ścian szczytowych	47 734,00 zł	5 877,00 zł	2%	12%
IV Izolacja ścian zewnętrznych	442 233,00 zł	41 870,00 zł	16%	9%
V Wymiana stolarki okiennej	0,00 zł	0,00 zł	0%	0%
VI Pozostałe	0,00 zł	0,00 zł	0%	0%
VII Koszt projektów	15 000,00 zł			
VII Koszt audytu	0,00 zł			
SUMA	762 592,00 zł	104 353,00 zł	41%	14%

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EIP Computer Model Outputs

2. Ready Solution

Rekomendacje (1)

1. Rekomendowane inwestycje gdy premia termomodernizacyjna nie jest dostępna

a. Wybór inwestycji

Kryterium:
Zwrot z inwestycji większy niż: 10%

Lista inwestycji	Czy spełnia kryterium	Wartość inwestycji	Oszczędność kosztów energii w zł	w %
Modernizacja instalacji CO i CWU	TAK	165 000,00 zł	32 780,00 zł	13%
Izolacja stropodachu	TAK	92 625,00 zł	23 826,00 zł	9%
Izolacja ścian szczytowych	TAK	47 734,00 zł	5 877,00 zł	2%
Izolacja ścian zewnętrznych	NIE	0,00 zł	0,00 zł	0%
Wymiana stolarki okiennej	NIE	0,00 zł	0,00 zł	0%
Pozostałe	NIE	0,00 zł	0,00 zł	0%
Łącznie		**305 359,00 zł**	**62 483,00 zł**	**24%**

Całkowity zwrot z inwestycji (%) 20% — **Suma oszczędności na $1 m^2$** 0,91 zł
Prosty okres zwrotu (lata) 4,9

b. Sposób sfinansowania inwestycji

Aktualny stan środków: 62 551,50 zł
Całkowity koszt inwestycji: 305 359,00 zł
Posiadane środki/koszt inwestycji: 20%

Czy inwestycja może zostać sfinansowana ze środków własnych NIE
Jeżeli nie to jaki jest okres zbierania funduszu aby było to możliwe przy obecnym poziomie funduszu (miesięcy) 94
Jeżeli podniesiemy fundusz remontowy o oszczędności z inwestycji, to jaki okres zbierania funduszu (miesięcy) 33

Finansowanie z kredytów bankowych

Wymagany wkład własny 20% — Obecny koszt kredytu 10%
% Funduszu który może zostać wykorzystany do obsługi zadłużenia 80%
Czy wspólnota posiada wystarczający kapitał własny TAK
Jeżeli "NIE" to jaki okres zbierania wkładu własnego przy obecnym poziomie funduszu remontowego 0
Jeżeli "NIE" to jaki okres zbierania wkładu własnego przy składce na fundusz remontowy podniesionej o oszczędności 0
Maksymalna miesięczna rata kredytu przy obecnym poziomie składki na fundusz remontowy 2 077,20 zł
Okres spłaty kredytu przy obecnym poziomie funuszu remontowego miesięcy: 440 lat: 36,7
Maksymalna miesięczna rata kredytu przy składce na fundusz remontowy podniesionej o oszczędności z inwestycji 5 856,97 zł
Okres spłaty kredytu przy składce na FR podniesionej o oszczędność miesięcy: 51 lat: 4,3

c. Sposób realizacji inwestycji

Wyłącznie ze środków własnych	Bez podnoszenia składek na FR	NIE
	Podnosząc składki na fundusz remontowy	NIE
Korzystając z kredytu bankowego	Bez podnoszenia składek na FR	NIE
	Podnosząc składki na fundusz remontowy	TAK

d. Zalecany poziom opłaty na funusz remontowy za $1 m^2$ 1,41 zł
e, Zalecany sposób realizacji inwestycji Korzystając z kredytu bankowego
f. Wymagany okres "zbierania" kapitału - miesiące 0

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Adam POOL, PP Investments, Poland

EIP Computer Model Outputs

3. Financing Alternatives

Rekomendacje (2)

2. Rekomendowane inwestycje z wykorzystaniem premii termomodernizacyjnej

a. Opis inwestycji

Kryterium:

Czy suma oszczędności większa od: 25%

Lista inwestycji	Czy spełnia kryterium	Wartość inwestycji	Oszczędność kosztów energii w zł	w %
Termomodernizacja budynku	TAK	762 592,00 zł	104 353,00 zł	41%

Całkowity zwrot z inwestycji (%) 14%

Prosty okres zwrotu (lata) 7,3

Suma oszczędności na 1 m² 1,67 zł

b. Sposób sfinansowania inwestycji

Aktualny stan środków 62 551,50 zł

Całkowity koszt inwestycji 762 592,00 zł

Posiadane środki/koszt inwestycji 8%

Czy inwestycja może zostać sfinansowana ze środków własnych NIE

Jeżeli nie to jaki jest okres zbierania funduszu aby było to możliwe przy obecnym poziomie funduszu (miesięcy) 273

Jeżeli podniesiemy fundusz remontowy o oszczędności z inwestycji, to jaki okres zbierania funduszu (miesięcy) 62

Finansowanie z kredytów bankowych i premii termomodernizacyjnej

Wymagany wkład własny 20%

Obecny koszt kredytu 10%

% Funduszu który może zostać wykorzystany do obsługi zadłużenia 80%

Czy wspólnota posiada wystarczający kapitał własny NIE

Jeżeli "NIE" to jaki okres zbierania wkładu własnego przy obecnym poziomie funduszu remontowego 35

Jeżeli "NIE" to jaki okres zbierania wkładu własnego przy składce na fundusz remontowy podniesionej o oszczędności 8

Maksymalna miesięczna rata kredytu przy obecnym poziomie składki na fundusz remontowy 2 077,20 zł

Okres spłaty kredytu przy obecnym poziomie funuszu remontowego miesięcy: 999 lat: 83,3

Maksymalna miesięczna rata kredytu przy składce na fundusz remontowy podniesionej o oszczędności z inwestycji 9 034,07 zł

Okres spłaty kredytu przy składce na FR podniesionej o oszczędnośc miesięcy: 100 lat: 8,3

c. Sposób realizacji inwestycji

Wyłącznie ze środków własnych	Bez podnoszenia składek na FR	NIE
	Podnosząc składki na fundusz remontowy	NIE
Korzystając z kredytu bankowego	Bez podnoszenia składek na FR	NIE
	Podnosząc składki na fundusz remontowy	TAK

d. Zalecany poziom opłaty na funusz remontowy za 1 m² 2,17 zł

e, Zalecany sposób realizacji inwestycji Korzystając z kredytu bankowego

f. Wymagany okres "zbierania" kapitału - miesiące 8

g. Wpływ premii termomodernizacyjnej na spłatę zadłużenia

Przewidywana wrtość premii termomodernizacyjnej 152 518,40 zł

Kwota kredytu do spłaty po uzyskaniu premii (przy założeniu że premia uzyskana zostanie od razu) 457 555,20 zł

Nowa wielkość raty kredytu

Możliwe zmiany:

Skrócić okres spłaty kredytu do (miesięcy) 66 lub obniżyć zaliczkę na fundusz remontowy do (za 1m²) 1,63 zł

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EIP Solution

- Main advantages:
  - Tested in Gdansk Wspolnotas (Co-ops)
  - Can link with Government programs or not
  - Accelerates energy efficiency investments
  - Easier to convince inhabitants with simulation
  - Savings start to appear after first investment
  - Lower financial risks for co-ops and banks
  - User friendly (administrator & financier)
    - Sensitivity analysis built in for scenario tests
  - Can be web based as well

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Applications await Funding

- Model could be easily used as
  - Financing tool by banks or clients
  - Training tool for administrators, bankers & owners
  - Promotion / acceleration of energy efficiency investments
- Steps to implement
  - Preparation of manual, disks and web site
  - Seminars for banks and administrators throughout Poland
- Cost of such capacity building in 16 Polish provinces around €100 000
  - EIP lacks such funding (suggestions welcome!)

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EIP Details

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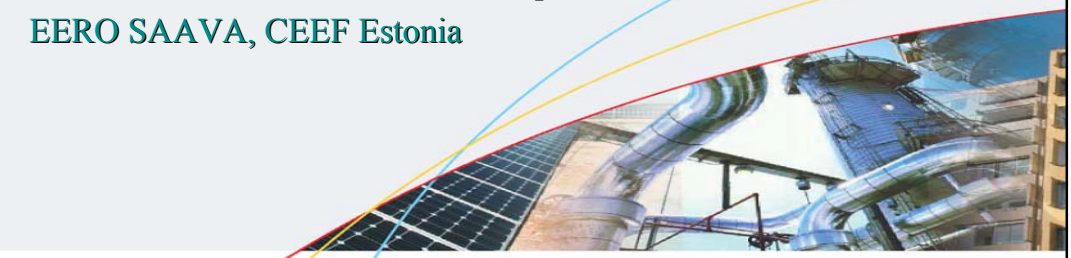
IFC | INTERNATIONAL FINANCE CORPORATION WORLD BANK GROUP

Financing of Energy Efficiency Projects: CEEF Program and it's role in the Central Europe

MARTIN DAŠEK, CEEF Czech Republic
EERO SAAVA, CEEF Estonia



Commercializing Energy Efficiency Finance (CEEF)

Content of the presentation

- IFC and CEEF Program in General
- Examples of CEEF Program Activities
- Buildings and Energy Efficiency in CEE

International Finance Corporation (IFC) – a Member of the World Bank Group

IBRD (International Bank for Reconstruction and Development) („The World Bank")

- Lends to governments of middle-income developing countries

IFC Promotes Sustainable Private Sector Development

- Provide loans and equity for viable projects
- Mobilize capital from other sources
- Provide advisory services
- Implement special programs like CEEF

IFC is owned by 175 countries of the world

IFC Focus on Energy Efficiency

- Business case in the CEE - vast untapped market
  - Limited investment to date in modernizations of SMEs, households and municipalities (together representing over 75% of energy consumption) creates opportunities for fast payback investment
  - Tremendous investment need, driven by EU legal framework and economics:
    - An estimated US$200 million/year will have to be spent for the next 15 years to reach OECD energy intensity level
    - Another US$350 million/year is expected to be invested into renewable energy sources
  - EE transactions represent attractive IRRs and create improved competitiveness & risk profiles for borrowers

How is CEEF designed to respond to it?

1. To help develop market with EE and RE finance
   - On the side of lending – support of banks and other FIs
   - On the side of borrowing – help to project sponsors and other stakeholders
2. Then to increase volume of EE and RE investment projects
3. And finally, to decrease GHG emissions and energy consumption, also increase effectiveness

IFC EE Programs in the CEE region

- **1997 – HEECP in Hungary**
  - HEECP (Hungarian Energy Efficiency Co-financing Program) – pilot phase (GEF = $5 million)
- **2001 – HEECP - second phase**
  - IFC investment up to $12 million
- **2003 –CEEF Program**
  - Commercializing Energy Efficiency Finance
  - Approved investment IFC + GEF = $ 90 million for five countries (Czech Republic, Slovak Republic, Latvia, Lithuania, Estonia), Hungary joined CEEF in 2005

CEEF Objectives

Expand availability of commercial financing for energy efficiency projects in 6 EU countries –Hungary, Latvia, Lithuania, Estonia, Czech Republic, Slovakia

Energy efficiency improvements generate:

Economic Benefits

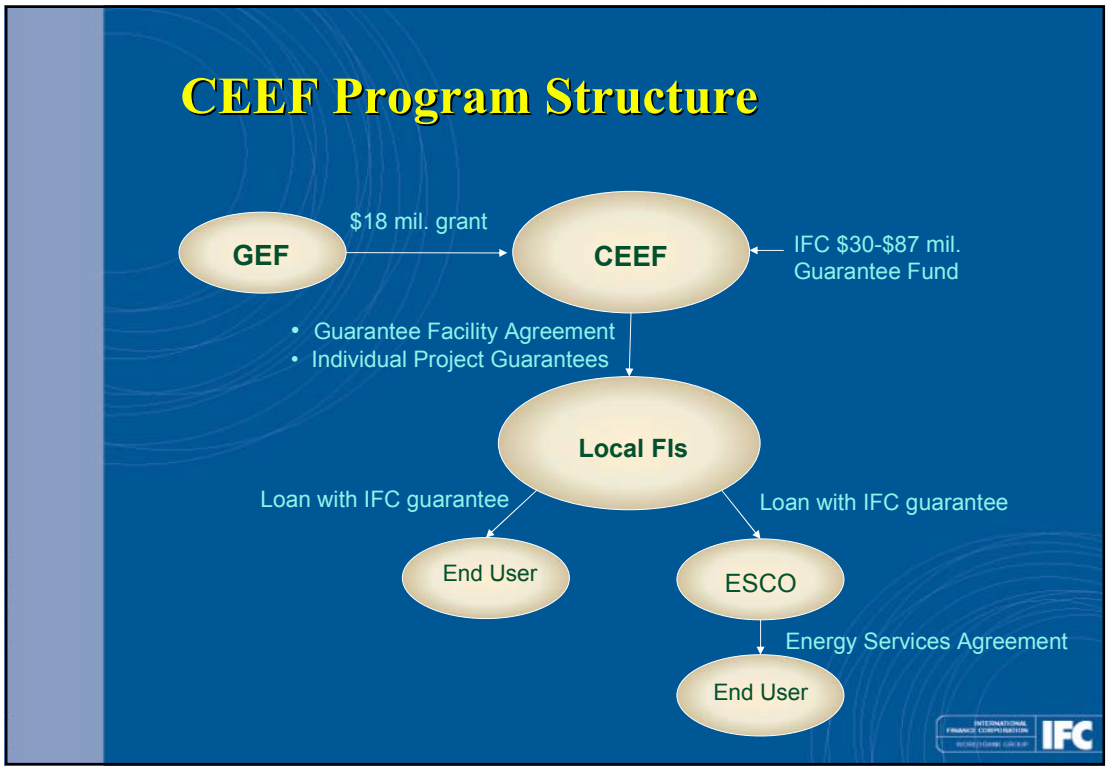
Decreased operating costs for companies/and users and hence increased international competitiveness for CEEF countries

Environmental Benefits

Decreased global and local greenhouse gas emissions due to avoided power generation

CEEF Program Tools

1. Risk sharing by providing partial guarantees for loans from domestic financial institutions
   - FIs take the lead: find projects, review credit, etc.
   - IFC guarantees up to 50% of loan principal
   - Maximum guaranteed amount €2 million
   - Minimum amount – no restriction (+ portfolio approach)
   - Maximum guaranteed term – 7 years
   - But guarantee is not the only goal, it is just main tool
2. Providing of the help (so called Technical Assistance (TA)) to end-users, FIs and ESCOs
   - This is the key activity for business development


CEEF Program Structure
GEF
$18 mil. grant
CEEF
IFC $30-$87 mil.
Guarantee Fund
• Guarantee Facility Agreement
• Individual Project Guarantees
Local FIs
Loan with IFC guarantee
Loan with IFC guarantee
End User
ESCO
Energy Services Agreement
End User
IFC


CEEF and it's practical role
• Cooperation with local FIs on providing of guarantees for loans, leasings and forfaiting
• Preparation of the loan products for EE projects
• Marketing of the FI´s services
• Training of FIs staff on financing of EE projects, transferring of the know-how to FIs
• Searching for bankable projects
• Helping ESCOs and end users to prepare projects
↳ Transforming market environment
IFC

Present Achievements of CEEF – I

- 10 currently participating banks:
  - Hungary – OTP, Raiffeisen, HVB, Erste, K&H
  - Slovak Republic - Dexia
  - Czech Republic - Ceska Sporitelna (Erste)
  - Latvia – Unibanka and Hansabanka
  - Lithuania – Hansa
- Discussions with other banks interested in the IFC-CEEF program are ongoing

Present Achievements of CEEF – II

- Guarantees portfolio – over US$ 15 mil.
- Current pipeline – over US$ 30 mil.
- Types of already financed/guaranteed projects:
  - Projects in SMEs – various improvements of energy systems, energy utilization
  - municipal district heating – system upgrades, fuel switch
  - wind power plants
  - biomass production
  - cogeneration
  - street-lighting upgrades
  - blockhouses reconstructions
  - upgrades of heating systems in public buildings

How can clients ..*and theirs banks*.. benefit from CEEF I (an example of TA)

- Buildings examples
  - IFC has developed a scheme for financing of energy retrofits in Hungary multifamily buildings, based on cash-flow collateral
  - IFC has been organizing ESCos tenders for blockhouses retrofits in large scale in Estonia, resulting to the commercial financing from local banks
  - IFC has been developing second mortgage product in Latvia, focusing on energy efficient renovations of single-family houses
  - IFC has developed a scheme for blockhouses retrofits together with Vilnius municipality, Lithuania
  - IFC has started cooperation with Building Savings Banks in CR

Buildings & Energy Efficiency in CEE I

Buildings & Energy Efficiency in CEE II

EE retrofits of residential buildings

Always:

- Important (30-40% of final energy consumption)
  - But 80% in heat consumption (residential sector)!!!
- With Big Potential +
- Visible +
- Technologically Easy +

Often

- Cost Effective +
- Politically and Socially Sensitive -

Buildings & Energy Efficiency in CEE II

Rarely

- Well managed (HOAs, Coops) -
- Supported by EU subsidies -
- Commercially fully viable -

Do exist some barriers there?

Buildings & Energy Efficiency in CEE III

For sure, barriers exist:

1. Legal
   - complicated legislation about ownership, decission-making and collateral structure
2. Sociological
   – low awareness and priority of energy matter
   – weak management and decission making
3. Social
   – limited ability of tenants to repay debt

Conclusions

- Cooperation with IFC-CEEF is helping
  - To banks in doing of right things better and increase revenues
  - To EE and RES projects in finding of right solutions of financing
  - IFC is going to extend CEEF in Russia first
- Building Energy Efficiency in CEE needs:
  - Better legal environment
  - Large political support incl. subsidies
  - Higher avareness of users
- IFC would like to lead in Sustainable Finance

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How can a bank ..*and its clients*.. benefit from CEEF – I

- Capacity building
  - General training of the bank's relationship managers
    - EE market overview, marketing approach
    - EE and RE basics
  - Advanced training of Credit Risk Managers
    - Specific EE project risks and their evaluation
    - Case studies
  - Additional one-purpose meetings with CRM
  - Specific project related know-how transfer

How can a bank ..*and its clients*.. benefit from CEEF – II

- Marketing activities
  - Market research, networking, market info sharing
  - Conferences + Seminars presentations
  - Execution of specific marketing activities
- Technical assistance
  - Know-how sharing in project finance structures
    - CEEF team is able to provide (and to co-finance) feasibility studies, energy audits etc.
  - By providing consulting to the bank during the project preparation stage to point-out specific EE issues

How can a bank ..*and its clients*.. benefit from CEEF – III

- Bank motivations for cooperation with CEEF
  - New projects/clients stimulation
  - Entering market niches and new sectors
  - Access to more risky projects with guarantee and IFC evaluation
  - Management of the bank exposure on existing clients
  - Know-how transfer in specific industry

How can clients ..*and theirs banks*.. benefit from CEEF I (an example of TA)

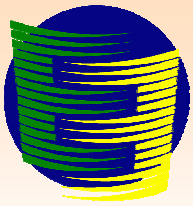
- IFC – CEEF as the first shop on the way for finance
  - Know-how sharing in project finance structures
    - IFC know commercial finance resources very well, may help with subsidies and other sources also
    - IFC partners are providing equity finance
    - CEEF team is able to provide (and to co-finance) feasibility studies, energy audits etc.
    - CEEF team is providing consultancy in projects preparation

How can clients ..*and theirs banks*.. benefit from CEEF II (an example of TA)

- Wind Power Project Example
  - What team did (for IFC, for the bank and finally for the client):
    - Independent engineering review about wind conditions in the locality
    - Analysis of the current legal framework in CR and EU and expected development regarding green electricity prices
    - Analysis of the all contracts, including Power Purchase Agreement and Equipment Delivery Contract
    - Risk and sensitivity analysis, economy modeling
    - Training of the bank officers about wind projects risks and opportunities

How can clients ..*and theirs banks*.. benefit from CEEF III (an example of TA)

- ESCo example
  - IFC has met a local branch of international ESCo to solve issue - how to finance more deals (EPC (TPF) projects), if resources of the company are fully utilized?
    - As the result CEEF has developed together with the bank new financial structure – forfaiting, i.e. selling already finished EPC projects (receivables) to bank (it is applicable both for private and public entities)



Financing Energy Efficiency - role of Governments

Dr. Tudor Constantinescu
The Energy Charter Secretariat

JRC –TAIEX Workshop "Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries" Tallinn
6-8 July 005

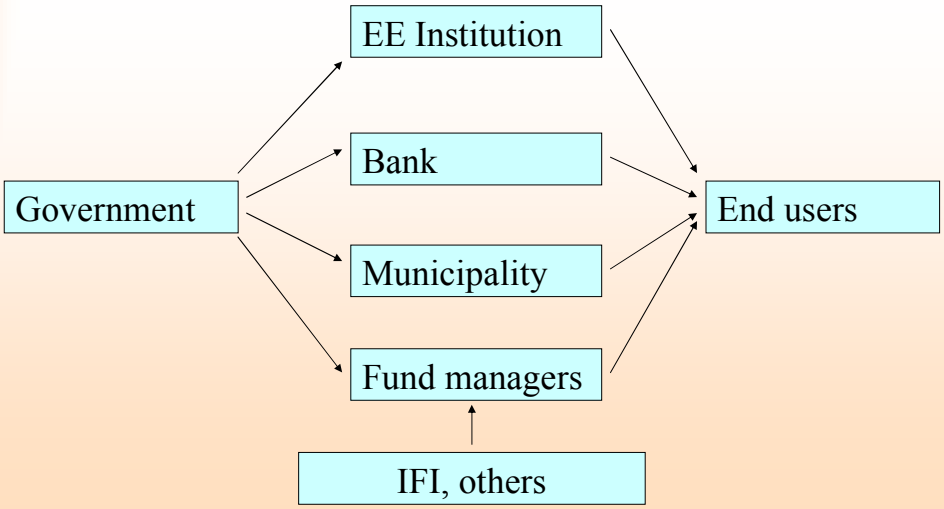
Role of Governments in EE financing

- Policy making (objectives, priorities, targets)
- Legislation and regulatory systems (EE laws, but also eg prices, DSM, Obligations on energy suppliers – e.g. UK EE Commitments)
- Institutions (e.g. Energy Efficiency Agencies)
- EE funds
- Specific measures directed to support Financing EE

Governmental Energy Efficiency Funds

- Hu: From 1 May 2004 – European Structural and Cohesion Funds available for EE projects (rate of co-financing increased at the same time)
- Li has 85 mil Euros from Structural Funds for EE
- La: EE Fund – joint project of the MoE and EU Commission granting low interest loans; funding of DH rehabilitation decreased in 2004
- Bg: EE Fund (EE Act 2004); low interest loans; KIDS Fund - 100% grants up to 5 MEuro
- Sl: EE and RES subsidy budget supplemented by PHARE (3.7 mill Euros in 2003, 50% more than in 2002)
- Cr – Environmental Protection and EE Fund (January 2004) – 25 mill Euros in 2004, 45 in in 2005
- Ro: Special Fund – 5.4 mill Euros for EE in 2004 (3.4 in 2003) – future unclear; FREE – 80% of investment costs

Governmental financial support



Grants and soft finance

- Direct support programmes – subject to certain requirements; mainly for residential sector; risk of free riders (objectives, priorities, targets); Ex: F, Hu, Nl, Pl, S
- Soft finance- free loans and grants covering interests and guarantees; Ex: Cz, Hu, Nl
- District Heating and CHP grants; Ex: Hu, Dk (70% savings, 30% of resources allocated)

The European Commission's Logical-Framework

- Prior and Retrospective evaluations
- Stratified approach – objectives, inputs, outputs; Discussion of:
- *efficiency* - whether the policy makes good use of resources (eg, whether consumers would have made the investments without a grant) - efficiency is often measured through cost-benefit analysis techniques;
- *effectiveness* - whether the policy achieves its immediate goals - such as a certain number of households insulating their roofs;
- *impact* - whether the policy achieves its specific objective - such as reducing energy consumption in participating households by 20%;
- *sustainability* - whether the benefits of the policy will be sustained when the subsidies or grants end or tax policies revert to normal.

Other financing instruments

- Technology procurement – facilitates market penetration of new efficient technologies – non-discrimination, equal treatment (information), transparency, proportionality (qualification requirements proportional to the supplies), mutual recognition – inspired by WTO Governmental Procurement Agreement; Ex: S, F
- Voluntary Agreements (or LTA, CA) industry, commercial, education , transport; Ex: Nl, Fi

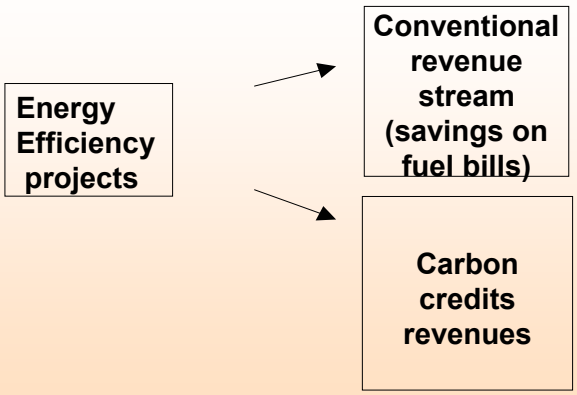
Taxation issues

- Energy taxes; "tax-shift" – tax energy consumption and reduce income tax – both environmental and employment benefits Ex: Nl, S
- Tax exemption; easier to administer than grants Ex: Cz, Fr, Nl, Ro
- Property tax; Ex: S, F, Cz
- VAT; Ex: Cz, Hu, Sk, Est, I (DH for residential)
- Accelerated depreciation; Ex: Nl (Vamil schemes)
- Need for coherence: high eg consumption penalised, improved energy efficiency rewarded

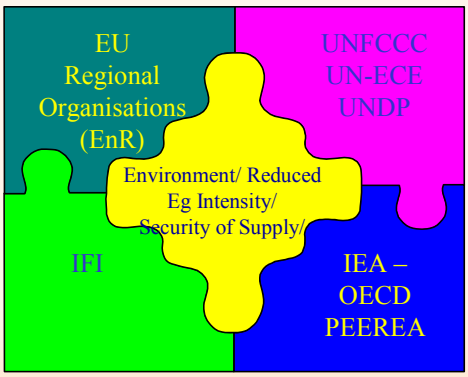
Banks and commercial financing

- Specific problems: insufficient awareness, lack of expertise, small project size, influence of production lobbies, low staff motivation
- Banks administering Government EE loans; Ex: Czech Trade Bank (CSOB) operates PHARE Energy Saving Fund; Hungarian Credit Bank (ABN AMRO) to administer German Coal Aid Fund; Polish Environmental Protection Bank;
- TPF – ESCOs; Governments impact by adapting price control to liberalised market conditions; VAT differences between ESCOs and energy supply; forerunners in using TPF for own buildings
- Revolving loan funds: Hungarian Public sector EE programme (Gov+GEF+UNDP) interst free credits to municiplities, hospitals, etc; Lithuanian EE Housing Pilot Project Gov+WB+Dk); Romanian FREE

Carbon trading and EE financing



Intergovernmental Co-operation on Energy Efficiency



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www.encharter.org

Capacity-building for GHG emissions reduction through energy efficiency in Romania

The UNDP/GEF Energy Efficiency Financing Team in Romania

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Capacity-building for GHG emissions reduction through energy efficiency in Romania

I will present you five themes today…

1. The UNDP/GEF Energy Efficiency Project in Romania
2. Results so far
3. Lessons learned
4. Banks' perspective on Energy Efficiency Financing
5. Opening up the market for lending to Block Associations ?!

Capacity-building for GHG emissions reduction through energy efficiency in Romania

So, let's begin!

1. The UNDP/GEF Energy Efficiency Project in Romania
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Capacity-building for GHG emissions reduction through energy efficiency in Romania

Four partners - ARCE, UNOPS, UNDP & GEF…

- **ARCE** - Governmental partner
- **UNOPS** - Executing agency
- **UNDP** - Implementing agency
- **GEF** - Main financier ($2 million)

Officially launched* the EE Financing Project in 2003

EE Financing Team was fully operational by January 2004

* Re-launch of an earlier initiative that had stalled in 2001 and was re-designed in 2002

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Overall approach…we are a catalyst

- We make **small** investments from the GEF grant…
- …to leverage **large** investments energy efficiency by third parties

Capacity-building for GHG emissions reduction through energy efficiency in Romania

We offer three basic services…

1. **Technical Assistance (T.A.)**
   - Typically a Feasibility Study by specialist consultants
   - Private sector and public sector are eligible
2. **Direct Contributions (D.C.)***
   - Equipment grant - maximum $50,000 or 20% of an investment
   - Only for public sector
3. **"Deal building"**
   - Bringing energy efficiency investors and financiers together
   - Advising on the range of commercial financing options that are available in Romania.

Capacity-building for GHG emissions reduction through energy efficiency in Romania

… and we offer two basic 'deals'

1. *If…* UNDP/GEF funds T.A. (usually a Feasibility Study)
   Then… Project Developer will carry out the EE project; and
   Financier will make investment funds available;

2. *If…* UNDP/GEF agrees to make a D.C. (equipment grant) *
   Then… Project Developer will invest in an EE project; and
   Financier will make investment funds available;

** D.C. is offered to public sector investors only, and disbursed after the investor has entered into a firm financing or works contract for the main investment. The maximum DC is the lower of $50,000 or 20% of the value of the investment.*

Capacity-building for GHG emissions reduction through energy efficiency in Romania

And this simple formula WORKS!

Capacity-building for GHG emissions reduction through energy efficiency in Romania

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Capacity-building for GHG emissions reduction through energy efficiency in Romania

Key financial results…

We have leveraged over $23 million of definite* investment so far…

Public sector/definite	$ 6,335,143
Private sector/definite	$ 17,537,500
Total/definite	$ 23,872,643

… expect another $7 million to result from work-in-progress…

Public sector/possible	$ 3,322,000
Private sector/possible	$ 3,650,000
Total/possible	$ 6,972,000

… and have a large and growing pipeline of potential investments

* ***'Definite' means a financing or works contract is now signed or awarded, or investment is under-way or complete.***

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Municipalities are investing in buildings, heating, water and lighting

Public Sector – Definite* - $6.3 Million

UNDP/GEF	Town/description	Investment	Main source of financing
DC	Panaci/ kindergarten	$21,000	Governmental financing
DC	Tg Jiu/ controls	$132,143	Grant financing
DC	Radauti/ meters	$175,000	Bank loan (BCR)
DC	Cluj/ controls	$187,000	Supplier credit
TA/DC	Tarnaveni/ buildings	$400,000	Bank loan (BCR)
TA/DC	Sighisoara/ schools	$300,000	Municipal financing
TA/DC	Alba Iulia/ schools	$620,000	Municipal financing
DC	Iasi/ district heating	$1,300,000	FREE loan (World Bank/GEF)
TA	Vatra Dornei/ water	$3,200,000	EIB, EU, Government.

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Municipalities are investing in buildings, heating, water and lighting

Public Sector – Possible* - $3.3 Million

UNDP/GEF	Town/description	Estimated Investment
TA	Rosu/ water pumps	$150,000
TA (DC)	Orastie/ lighting/schools	$350,000
TA (DC)	Victoria/ building	$140,000
TA (DC)	Tulcea/ district heating	$960,000
TA (DC)	Brad/ water pumps	$1,300,000
TA (DC)	Vaslui Solesti/ water	$500,000
(DC)	Focsani/ water pumps	$162,000
TA (DC)	Valea lui Mihai/ lighting	$150,000
TA (DC)	Salonta/ lighting	$250,000

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Companies are lowering heat, hot water, steam and power costs, often using renewable fuels or CHP

Private Sector – Definite* - $17.5 Million

UNDP/GEF	Company/description	Investment	Main source of financing
TA	Nord Simex/ wood waste	$600,000	Bank Financing (BRD)
TA	Ulerom/ sunflower husks	$560,000	FREE loan (World Bank/GEF)
TA	Iridex/ hospital waste	$1,377,500	Leasing (Piraeus)
TA	Sicomed/ CHP	$2,000,000	BOOT - RAEF/RIEEC
TA	Barlad/Rulmenti/ CHP	$13,000,000	Bank Financing (BCR)

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Companies are lowering heat, hot water, steam and power costs, often using renewable fuels or CHP

Private Sector – Possible - $3.6 Million

UNDP/GEF	Company/description	Estimated Investment
TA	Bucharest/Isovolta/ steam generation	$700,000
TA	Victoria/Viromet/ secondary steam to power	$300,000
TA	Ploiesti/Timken/ CHP	$2,000,000
TA	Dej/Samus Mex/ wood-waste	$350,000
TA	Matex/textiles/ steam/compressors/boilers	$300,000

Capacity-building for GHG emissions reduction through energy efficiency in Romania

We also have a 'Capacity Building' role…

- Organise/speak at events and training courses
- Publish articles and brochures
- Create posters with thermal images, demonstrating heat loss from buildings and proposing technical and financial solutions
- Sensitize banks to EE lending opportunities
- Promote non-traditional financing (ESCOs, BOOT)
- Create employment for energy efficiency practitioners
  - directly, by contracting Feasibility Studies
  - indirectly, as the recommendations of the studies are implemented

Capacity-building for GHG emissions reduction through energy efficiency in Romania

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Capacity-building for GHG emissions reduction through energy efficiency in Romania

Lessons learned…

'Tips and tricks' from the UNDP/GEF Team

1. How to recognise an EE idea that is likely to become an investment
2. How to build a 'sausage machine'
3. How to get banks to make energy efficiency loans
4. How to identify a suitable financier

Capacity-building for GHG emissions reduction through energy efficiency in Romania

How to recognise an energy efficiency idea that is likely to become an investment

An enthusiastic, empowered decision-maker!
- Managing Director… with the support of the Board; or
- Mayor… with the support of the local council

This is why of the many investment proposals that we find…
- 75% are technically robust
- 50% are financially viable
- Only 10 - 15% involve stakeholders who are committed

Capacity-building for GHG emissions reduction through energy efficiency in Romania

How to build a sausage machine

Why do you need a 'sausage machine'?

- Energy efficiency investment proposals are diverse.
- Large numbers of very different types of proposals arrive

Skills required to identify and process investm. ideas

- Outreach, engineering, banking, finance and admin.

So, a multidisciplinary team with a mix of local knowledge is desirable

Capacity-building for GHG emissions reduction through energy efficiency in Romania

This is how the UNDP/GEF Team operates

- Outreach Manager – finds energy efficiency proposals/ideas
- Energy Efficiency Manager – checks that the idea is technically robust
- Head of Banking Relations – checks that the applicant is creditworthy
- Finance Manager – brings in an outline financier, and builds a deal
- Office Manager - procures consultants/equipment, using UN procedures
- External consultants – (15 companies so far) perform Feasibility Studies

Then borrower borrows, lender lends and the investment takes place!

Capacity-building for GHG emissions reduction through energy efficiency in Romania

How to get banks to make energy efficiency loans

Financiers feel comfortable if they understand the investment

- So get a outline financier on board from Day 1
- We insist that the investor finds a commercial financier to sign an Agreement-in-Principle… *before* we invest in a study

We involve the financier of all steps towards investment

- Invitation to comment on ToRs for Feasibility Studies
- Invitation to help evaluate offers, copies of interim reports

These actions help keep the project 'live' in the bank's loan pipeline

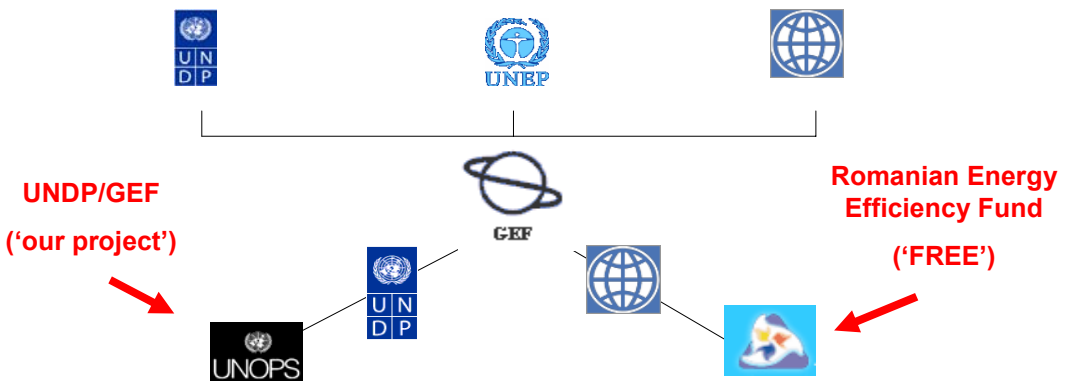
Capacity-building for GHG emissions reduction through energy efficiency in Romania

How to identify a suitable financier

We provide the following advice to investors…

1. If you have a good relationship with your bank… use it!
2. We advise on financing options that are available in Romania – local banks, international banks, leasing companies, ESCOs, supplier credit
3. If the investor has no preferred financier, we introduce our 'sister' GEF project – the **FREE**

Capacity-building for GHG emissions reduction through energy efficiency in Romania



Capacity-building for GHG emissions reduction through energy efficiency in Romania

Summary of lessons learned…

- If the Managing Director or Mayor is committed to invest, everything else will fall into place. If not – walk away!
- You will need a strong, multidisciplinary team with good local knowledge to find and process multiple investment proposals
- Get a financier on board from Day 1
- In countries where there is a developed banking market, creditworthy investors usually have a preferred bank

Capacity-building for GHG emissions reduction through energy efficiency in Romania

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Capacity-building for GHG emissions reduction through energy efficiency in Romania

Lack of **INTERNAL EXPERTISE** to evaluate EE projects

Lack of **FAMILIARITY** with EE business specificity

Banks' perception on EE lending = 'Risky business'

Lack of dedicated **LOAN PRODUCTS** EE field not seen as a TARGET MARKET

Lack of **AWARENESS** about the EE market PROSPECTIVES

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Banks' involvement in financing EE

- There is a certain 'appetite' for EE loans although EE is not a targeted business
- General financing terms and conditions become more and more accessible
- **Clear preference** for lending to private companies
- **Increasing interest** in lending to public sector
- **No interest or low interest** in lending to block associations (housing cooperatives)

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Typical lending conditions

Amount:	80% from the investment (without VAT!)	
Tenure:	3 - 7 years; 10 - 25 years (public sector)	
Grace:	3-12 months	
Interest:	LIBOR 3M(3.5%) or EURIBOR 3M (2.1%) BUBOR 3M (9.8%)	+ risk margin (0.5-5%) corporate clients
	PRIME (BASE) RATE (ROL 14%, $ 8%, € 7%)	+ risk margin (0-3%) SME's
Collateral:	mortgage, equipment pledge, assignment of receivables…	
Cover Ratio:	120% of principal + first year interest	

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Typical approach

- Banks will finance the company not the project
- Lending decision will rely on the assessment of the client's creditworthiness and transactional behavior
- 'Repayment from savings cash-flow' concept less used in credit analysis
- Accounting system does not allow for energy savings 'intercept'

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Who breaks the ice?

46 Agreements-in-Principle in place

- Romanian Commercial Bank
- Romanian Development Bank Groupe SG
- Banca Transilvania
- Raiffeisen Bank Romania
- Bancpost
- SanPaolo Imi Bank
- Romanian Fund for Energy Efficiency (WB/GEF)
- Romanian Industrial Energy Efficiency Company (EBRD)

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Capacity-building for GHG emissions reduction through energy efficiency in Romania

Housing stock in Romania

2002 Census reveals…

- Population 21.7 million
- Residential buildings 4.8 million
  - –Out of which 85,ooo Blocks of Flats
- Households 8.1 million
  - –Out of which 3 million in Blocks of Flats
- 78% of residential buildings aged > 25 years

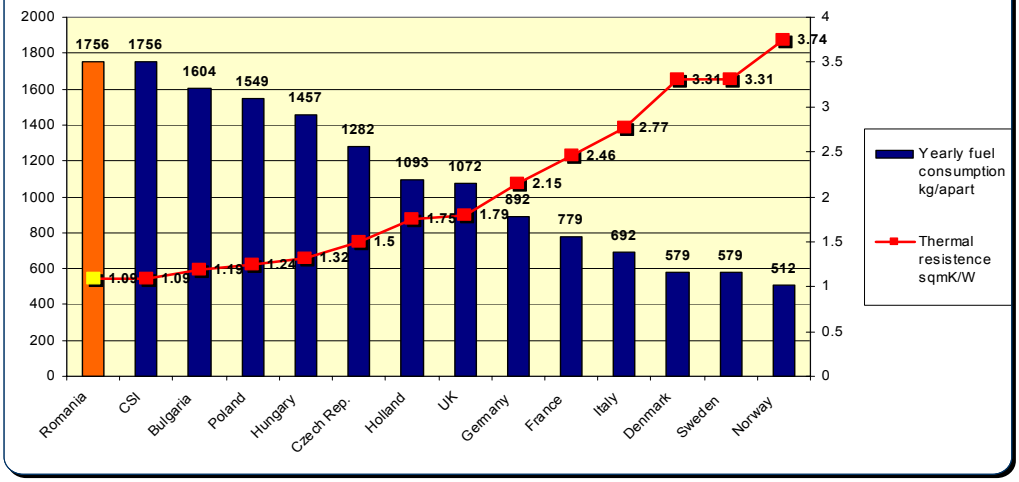
Capacity-building for GHG emissions reduction through energy efficiency in Romania

Housing stock in Romania

• Very high heat demand	2 or 3 x higher than EU
• Heating and warm water supply for the 85,ooo (B/F)	37-48% of the residential energy consumption
• B/F built before 1985	60% require extensive rehabilitation
• Energy savings after rehabilitation	minimum 30% estimated

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Yearly fuel consumption 3-room apartment
(20 C inside / -15 C outside)



Stefania RACOLTA, UNDP GEF, Romania

Capacity-building for GHG emissions reduction through energy efficiency in Romania

The time is right for communal investments in apartment blocks…

- **Energy bills are now quite high, so investment -**
  - lowers energy bills;
  - raises quality-of-life; and
  - raises property values

… but the market is performing badly

- Block associations / Housing cooperatives have no tradition of borrowing;
- Banks have no tradition of lending to block associations;
- There are many other barriers to be overcome

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Barriers to overcome

Organisational – achieving consensus within block associations

Financial – 3 categories of block associations (BA)

- well managed and bankable - do not fall into debt -> cash reserves and repairing fund
- well managed but not bankable – do fall into debt -> no cash reserves, no repairing fund
- badly managed

Social – different income categories sharing the same apartment building

Informational – BA managers do not understand EE
– Most banks have never done business with BA

Market – BA inexperience in contracting major repairing works

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Who should be interested in 'cracking open' this market ?

- **The banking community**
  - As it is an under-developed, $4 billion loan market (if we assume only $500 of investment per household)
- **The environmental/social community**
  - Governmental agencies, NGOs and international organisations with environmental and social agendas.

Each community has its separate role in making this market work!

Capacity-building for GHG emissions reduction through energy efficiency in Romania

The role of banks and guarantors

- Create dedicated loan and guarantee products for block associations.

The role of governmental agencies and bodies

- Tailor grant and subsidy programmes to harmonise with financing facilities offered by the banks.

Capacity-building for GHG emissions reduction through energy efficiency in Romania

The role of international organisations

• Mobilise technical assistance and fund events to get the governmental agencies, NGOs and banks working together.

The role of NGOs

• Become 'mobilisers of demand' for EE loans -work directly with block associations to explain the **need** for energy efficiency, and present them with an integrated package of technical and financial solutions.

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Present situation

• Only 3 financial institutions (BCR, Volksbank and CHF) offer loan products for Block Associations

• Products are quite expensive

• Security package require pledge on financed equipment and sometimes 1-3 mortgages !!!

•Require consensus of 80% up to 100% of the Association members – hard to achieve mostly due to low-income families

Capacity-building for GHG emissions reduction through energy efficiency in Romania

The National Program for Block Rehabilitation

- Government supports energy audit and technical studies and provides a subsidy
- Program Scheme:
  - Governmental grant of 25%
  - BA own contribution of 15%
  - Commercial bank loans for the rest of 60%
- NO **functional mechanisms** in place yet !!!
- Only **PILOT and DEMONSTRATION** projects have been done with the support of the international cooperation funds (GTZ and SECO) !!!

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Envisaged actions for promoting EE in residential multi-apartment buildings

- Launching a country-wide **Awareness Campaign** on Energy Efficiency measures for Block Associations
- Using the **thermal camera imaging**, printing posters and presenting them to BA in order to have a clear indication of heat losses in their buildings and present them several options for financing

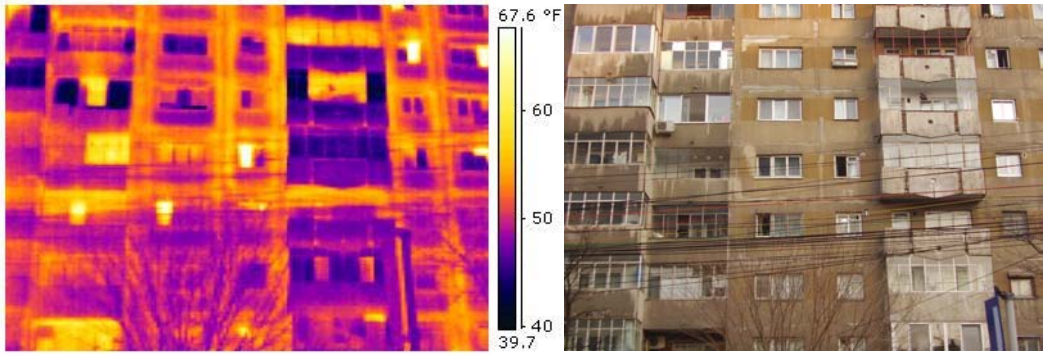
Capacity-building for GHG emissions reduction through energy efficiency in Romania

Envisaged actions for promoting EE in residential multi-apartment buildings

- Intensive **lobby with the Ministries** to propose a **re-design** of the existing governmental scheme, including special packages for low-income households
- **Discussions with FI** (banks and guarantee funds), persuading them to create loan products for the BA
- **Active communication with the housing NGOs** with a view to identify bankable BA willing to invest now in lowering their communal bills

Capacity-building for GHG emissions reduction through energy efficiency in Romania

Block 32, Banu Manta Av., No. 29, District 1, Bucharest



Capacity-building for GHG emissions reduction through energy efficiency in Romania

Conclusions

- Residential EE market has a huge savings potential in RO
- Market size estimated at minimum $ 4 BILLION
- Market badly underserved by the financial community
- Banks have no tradition of lending to BA
- BA have no tradition of borrowing
- Governmental scheme existing only on paper, not operational in reality
- No commercially financed block rehabilitation in place yet

Capacity-building for GHG emissions reduction through energy efficiency in Romania

To trigger this market in Romania…

- There is a clear need for an **INTEGRATED PACKAGE** of:
  - grants and subsidies,
  - dedicated loan & guarantee products and
  - technical assistance
- UNDP/GEF Financing Team is working on getting the banking and the social communities put together a

ONE-STOP-SHOP for block associations

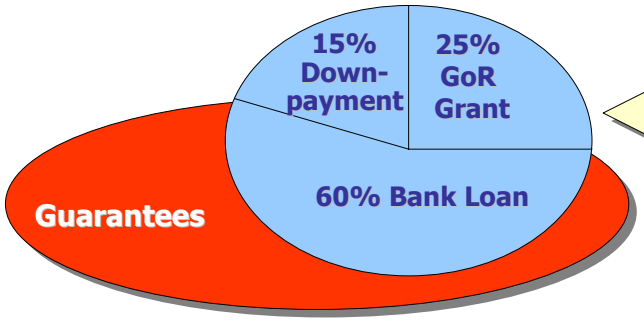
and get the Government's commitment probably through a re-design of the National Program of Building Rehabilitation.

Capacity-building for GHG emissions reduction through energy efficiency in Romania

ONE-STOP-SHOP

TECHNICAL ASSISTANCE

FINANCING



Capacity-building for GHG emissions reduction through energy efficiency in Romania

Questions?

Remarks?

Suggestions?

Capacity-building for GHG emissions reduction through energy efficiency in Romania

The UNDP/GEF Energy Efficiency Financing Team in Romania

www.energie.undp.ro

Stefania Racolta
Head of Banking Relations
UNDP/GEF

UNOPS Project Office
45 Washington Street
Bucharest, Romania

Energo Banking
Central & Eastern Europe

Financial engineering for funding of energy efficiency at district heated buildings

Botond Weöres, CFA
EnergoBanking Kft, Hungary
July 6-8, 2005

1

Energo Banking
Central & Eastern Europe

Transferring of ESCO know-how among OTP Bank Group members

Slovak Republic – OTP Banka Slovensko
- ESCO established for public lighting modernization
- EUR 2 million credit line

Hungary – OTP Bank
- EUR 5 m public lighting
- EUR 10 m indoor lighting
- EUR 10 m heating
- EUR 20 m district heating
- EUR 10 m industrial energy efficiency.

Croatia – Nova Banka
- Refinancing of EUR 500 thsd industrial energy efficiency

Romania - RoBank
- ESCO established for public lighting modernization
- EUR 2 million credit line
- Incashing rights are difficult to be enforced due to Treasury handling municipal accounts

Bulgaria – DSK Bank
- ESCO established for lighting modernization
- EUR 2 million line already exploited
- Further EUR 6 million under arrangement

2

Energo Banking Central & Eastern Europe

Review of district heating framework

Owner

Municipality

Heat supplier

District heater — EU ETS or JI

- 110 towns
- over 200 district heating networks

Fixed base fee
Variable heat fee — non EU ETS

Heat consumer

	Residential	**Municipal institutions**	**State budgetary institutions**
	➢ 650 thousand homes in prefabricated block houses	➢ Hospitals (110 hospitals) ➢ Healthcare & social institutions ➢ Educational institutions (5 thousand schools) ➢ Sport facilities and spas	➢ Ministerial and other agencies ➢ County hospitals (20) ➢ Post offices (2,500 offices) ➢ Universities & dormitories ➢ Military, border control, and firemen shelters ➢ State prisons
Balance sheet reporting	➢ No financial balance sheet	➢ Financial balance sheet ➢ Regulated leverage	➢ Financial balance sheet ➢ Regulated leverage
Credit risk	➢ High credit risk	➢ Lower credit risk	➢ Lower credit risk
EU granting	➢ No direct EU granting	➢ Available EU granting	➢ Available EU grants
Public procurement	➢ State grants through public procurement	➢ Public procurement	➢ Public procurement

3

Energo Banking Central & Eastern Europe

Available financial instruments

Loan Financing

On balance sheet	Off balance sheet		
Loan	ESCO	Leasing	Forfeiting
- MFB Municipal Loan (EIB) - MFB Panel Program - Commercial Bank Loan - Subsidized interest loan (State) - Financial leasing - Phare Revolving loan till 2008 - Coal Fund for Energy Savings	- Operational	- Bank + IFC	

Equity financing

Own equity		External sources	
Cash	In kind contribution	Investor	Grants
- Home savings (LTP) - Bank prefinancing		- State - Financial (MFB) - Strategic - Mezzanine	- KIOP (Struct Fund) - ETS/JI/VER/ (CO_2) - NEP (State Program) - Panel (State) - LTP (State) - UNDP/GEF (UN) -URBAN II. (EU) - EIE - Save (EU) - FP 6 SUSTDEV (EU)

Securitization

Colleteral	Loan guarantee	Bankguarantee	Cash-Flow	Insurance	Transfering title
- Equipment - Real estate	- IFC (WB) - Hitelgarancia Rt (State)	- Bank guarantee - Insurance bond	-Guaranteed energy saving - Discounted district heating base fee - Municipal fee contribution - Homeowner fee contribution	- Building-construction - Entrepreneurial Wealth - Home insurance - Apartment insurance	- Revenues - Grants & subsidies - Insurance - LTP

Color codes applied:
- Municipal (red)
- Condominium and Housing cooperatives (blue)
- Both of the above (green)

4

Energo Banking Central & Eastern Europe

Municipal & state budgetary institutions
Standard loan based financing alternatives

	Municipal MFB loan	EUR market based loan	ESCO / Operational lease	Forfeiting
a) Source of debt	• MFB loan	• EUR based loan	• ESCO portfolio loan / lease	• No direct taking on loan
b) Debt taker / source securer	• Municipality or assigned party by municipality	• Municipal Property Management Kft.	• ESCO / Lessee	• At construction: Constructor prefinancing
c) Debt appearance on books	• Municipality or assigned party by municipality	• Municipal Property Management Kft.	• At cons: ESCO/constructor After constr: ESCO / lessee	• At construction: Constructor • After con: off balance sheet
d) Owner of investment	• Municipality	• Municipal PM Kft	• ESCO / Lessee	• Constructor → Municipality
e) Interest rates	• EURIBOR + 3.5%	• EURIBOR + 1.5%	• Lease fee: EURIBOR +4%	• Discount: **fix** BUBOR+4.5%
f) Exchange rate risk	• None (built in the interest already)	• HUF vs. EUR	• In case of EUR base	• None (HUF receivables)
g) Period	• Maximum 20 years	• Generally 7-15 years	• Life span of equipment	• 7 - 15 years
h) Own equity	• 10% (prefinancable)	• Can be neglected	• 0-20% own equity	• After construction: 0%
i) VAT rate and reclaimability	• 25% not reclaimable	• 25% not reclaimable	• VAT included in rental / service fee ESCO: 15% vs 25% CapEx	• 25% not reclaimable
j) VAT payment time	• At period beginning	• At period beginning	• Gradually over period	• At period beginning
k) Grace period	• 3 years	• Limited	• Not applicable	• Not applicable
l) Public tendering of financial service	• Mandatory	• Mandatory	• ESCO - Avoidable • Lease - Mandatory	• Avoidable – no financial service
m) IFC guarantee	• Limited role	• Limited role	• Limited role	• Some role
n) Other	• Standardized	• KIOP can be prefinanced upon contracting	• Difficult to apply for KIOP	• KIOP can be prefinanced upon contracting

Color code: Advantage (red) Disadvantage (blue)

5

Energo Banking Central & Eastern Europe

Condominium / housing cooperatives
Standard loan based financing alternatives

	HUF based loan	EUR based loan	ESCO	Forfeiting
a) Source of debt	• HUF bank loan + LTP	• EUR bank loan + LTP	• ESCO portfolio credit line	• No direct taking on loan
b) Debt taker / source securer	• Condominium	• Condominium	• ESCO	• At construction: Constructor • After construction: Bank
c) Debt appearance on books	• Condominium (no books)	• Condominium (no books)	• ESCO	• At construction: Contsructor • After constr: off balance sheet
d) Ownership of investment	• Condominium	• Condominium	• ESCO → Condominium	• Constructor → Condominium
e) Interest rates	• BUBOR + 4%	• EURIBOR + 4%	• BUBOR + 2% (ESCOs rate)	• Discount: fix BUBOR + 7%
f) Interest rate subsidy	• 70% in first 5 years • 35% in second 5 years*	• No interest rate subsidy	• No interest rate subsidy	• No interest rate subsidy
g) Exchange rate risk	• None	• There is risk	• None	• None (for HUF receivables)
h) Period	• Maximum 10 years (LTP)	• Maximum 10 years (LTP)	• Maximum 10 -15 years	• Maximum 10 years (LTP)
i) LTP (prefinancing)	• Prefinancable after 0 to 3 months of presavings	• Prefinancable after 0 to 3 months of presavings	• Transferred to ESCO	• Prefinancable after 0-3 months of presavings
j) VAT	• 25% not reclaimable	• 25% not reclaimable	• 15% not reclaimable	• 25% not reclaimable
k) VAT payment time	• At period beginning	• At period beginning	• Gradually over period	• At period beginning
l) IFC guarantee	• Loan guarantee	• Loan guarantee	• Guarantee is necessary	• Forfeiting guarantee is necessary

Color code: Advantage (red) Disadvantage (blue)

6

Energo Banking Central & Eastern Europe

National Blockhouse Modernization Program

Breakdown of the funding of modernization expenditures:

- **1/3 - financed from the state budget in form of nonrepayable grant**
  - Total amount of central budgetary grants available in 2005: HUF 6 billion
  - Maximum grant by home HUF 400 thousand
  - Deadline for applications by the municipalities: September 30, 2005
  - Precondition is availability of remaining 2/3 of financing
- **1/3 - financed by the municipality in form of non-repayable grant,**
  - Source of municipal backing can be MFB zero interest loan (15 years)
  - Deadline for application by block houses: July 31, 2005
- **1/3 to be financed by home owners in form of own equity or external loan**
  - Zero interest MFB loan transferred from the municipalities (15 years)
  - LTP (mortgagee savings 30% matched by the government)
  - Energy savings (40% in volume, but only 20% in costs due to base fee) from:
    - Modernization of heating system, thermostatic control applications;
    - Building technologies modernization ;
    - Changing or isolation windows;
    - Posterior isolation of facades.
  - Reduced district heating base fee in cooperation with district heater (also owned by municipalities)

7

Energo Banking Central & Eastern Europe

Funding of modernization at the District Heater

- MFB Municipal Infrastructure Loan (backed by EIB)
  - EURIBOR base without exchange rate risks
- KIOP – Environmental Infrastructure Operative Program
  - 60% grant for renewable energy based district heating at small towns
  - 40% grant for municipal district heating energy efficiency upgrades
  - Own equity also semi-financed by central budgetary funding
- AVOP
  - 40-70% grant for agriculture related renewable energy projects
- Sale of emission reduction under EU ETS / JI / VER
  - from aggregate energy efficiency at consumption side modernization
  - from energy savings at generation and transmission side
  - from fuel switch to renewable energy
- Cash flow from:
  - sale of cogenerated electricity to the grid
  - purchase price reduction associated with stepping out to the free natural gas market in hope of up to 10% cost saving

8

Energo Banking
Central & Eastern Europe

Summary of opportunities and challenges

- Range of opportunities:
  - Inefficiency at energy generation and consumption
  - Increasing energy prices putting pressure to modernize
  - Increasing disposable incomes and environmental awareness
  - Support of residential energy modernization through district heating modernization supportable by EU funding, (while direct residential support would be not)
  - Availability of long term financial instruments (on and off balance sheet)

- Some challenges:
  - District heating base fee independent of consumption
  - High and not reclaimable VAT (currently at 25%)
  - Public procurement and lengthy municipal decision making
  - Exchange rate and interest rate risks
  - Combination of financial instruments (off balance sheet instruments with EU funding, supported interest rate loans)
  - Integrating stakeholders short / medium / and long term interest
  - Funding organized by a number of different institutions each involving lengthy preparation processes.

9

Energo Banking
Central & Eastern Europe

Our contact details

Energo Banking
Central & Eastern Europe

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10

"Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries" workshop
Tallinn, 6-8 July 2005

Economic Commission for Europe

Energy Efficiency 21

EE21

Gianluca Sambucini
Project Manager

Energy Efficiency 21

- Background
- Financing Energy Efficiency Investments for Climate Change Mitigation
- Recent Developments
- Next Steps

Background

- Launched in 1991 - 4 three-year phases
- Enhance East-West Trade and Co-operation
- Improve Capacities and Networking
- Policy Reforms
- Financing Energy Efficiency Investments

Background

- Regular Budget and Trust Fund
- US$ 200,000 per year
- US$ 2 million UN Foundation & Partners
- US$ 1.75 million UN General Assembly
- € 400,000 European Commission – SAVE
- RENEUER USAID and USDOE

Background

- 10,000 Experts, 150 Events, 43 Countries
- 250,000 m^2 Exhibition, 38 Locations
- Website 55,000 Visits per year
- US$ 60 million in 30 Business Plans
- US$ 9 million financing approved in Belarus, Bulgaria, Russia, Ukraine World Bank

Recent Developments

New Publications to promote market formation

2004:

- Energy Efficiency Policies and Measures in Europe
- Experience of International Organisations in Promoting EE – Bulgaria, Belarus, Kazakhstan, The Russian Federation, Ukraine
- Energy Security Risks and Financial Markets

2005:

- Financing EE and Climate Change Mitigation
- Financing EE Investment Projects

Financing Energy Efficiency and Climate Change Mitigation – Energy Series N. 28

A Guide for Investors in Belarus, Bulgaria, Kazakhstan, The Russian Federation, Ukraine

Addresses to:

- managers and decision-makers in charge of district heating, municipal lighting, hospital heating and power supply
- managers of foreign or domestic funds (searching for profitable energy efficiency investments)

Recent Developments

Selected Project Events

- October 2004 – BISE, Grenoble
- November 2004 – CEI SEF 2005, Portoroz
- February-April 2005, Paris, French MAE/ FFEM
- February 2005 – EBRD Donors Meeting for the SEE, London
- April 2005 - Board of EBC, Berlin
- May 2005, UNF/UNFIP, GEF, USAID, NY & W. DC,
- May 2005, Meeting on Energy and Health, WHO, Rome
- 30 June - 1 July 2005, 16th Session of the EE21 Project Steering Committee, Geneva

General Objective

"Enhance regional cooperation on energy efficiency market formation and investment project development to reduce greenhouse gas emissions in economies in transition"

Activities

Immediate Objectives

- Carbon Emissions Trading Standards
- Finance Energy Efficiency Investments
- Promote Policy Reforms & Sound Business

Objectives

- Identify and develop investment projects
- Strengthen energy efficiency and renewable energy policies
- Promote opportunities for banks and commercial companies to invest in energy efficiency projects

Develop Investment Projects

Identify, develop, finance and implement demand side and supply side energy efficiency investment projects

- Network of Energy Efficiency Managers
- Trained Experts
- Investment Project Pipeline

Strengthen Energy Policies

Assist municipal and national authorities to introduce economic, institutional and regulatory reforms that support investment projects

- Broad analysis policy reforms and case studies
- Senior Decision Maker Seminars
- Policy Advisory Services

Energy Efficiency Investments

Promote investment opportunities in energy efficiency and renewable energy projects through a professionally managed Fund

- Investment Fund
- Investment Project Development Standards
- Investment Project Pipeline Inventory

Financing Investments

- Public Private Partnership
- Dedicated Fund
- SwissRe, IXIS Bank, EE Capital, EBRD
- Project Selection Criteria
- EE21 Project Preparation
- Disseminate Experience to Network

Recent Developments

- United Nations Foundation
  US$ 2 million June 2004
- French Ministry of Foreign Affairs /
  French Global Environment Facility (FFEM)
  € Euro 2 million March 2005
- Global Environment Facility UNEP – GEF
  US$ 3 million 2005

Next Steps

- Complete GEF Project Document
- Nomination of National Coordinators
- Confirmation In-Kind Contributions
- Project Meeting 1-2 December
- Approval Project Document
- Preparation EE21 Project Plan 2006-2009
- First half 2006 Project Operations Begin

For more information

- www.unece.org/ie/
- www.ee-21.net
- Gianluca.Sambucini@unece.org

Romanian Energy Efficiency Fund

Directorate General Joint Research Centre

Technical Assistance Information Exchange Instrument

Directorate General Enlargement

Crediting Intelligent Consumption: Steps to Success

'Energy Efficiency potential in buildings, barriers and ways to finance projects in New Member States and Candidate Countries'

INFRA 12311: Workshop on Scientific Technical Reference System on Renewable Energy & Use Efficiency

Tallinn, Estonia
July 6 - 8, 2005

Romanian Energy Efficiency Fund

Summary

- National Market Ignition and Development
- Investment Financing Offer
- Financing Criteria
- National Market Data
- Conclusions

Mihai VORONCA, FREE, Romania

Romanian Energy Efficiency Fund

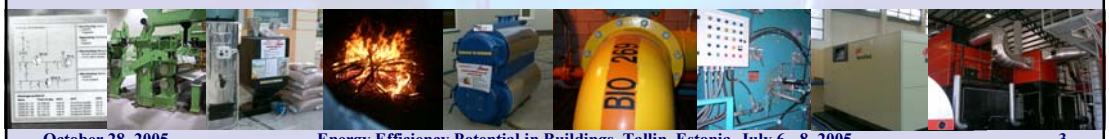
Market Ignition and Development

Aim: To attract a Substantial Amount of Direct and Parallel Commercial Co-financing of Energy Efficiency Investments
(Romanian banks, foreign banks with Romanian branches, local and foreign capital sources).

Energy End-user Investment Financing (private owned and PPP operators and municipalities):

- direct;
- through Intermediaries (Success Fee).

Commercial Financing of Energy Service Companies (ESCO)



Romanian Energy Efficiency Fund

Investment Financing Offer

Metering

Outdoor and Indoor Lighting

Heat End-use Rehabilitation

Energy Efficiency Demand Side Management

Thermal Rehabilitation

Power Factor Improvement

Mihai VORONCA, FREE, Romania

Romanian Energy Efficiency Fund

Investment Financing Offer (continuation)

- Technological Processes Modernization
- S&MS Co- and Tri-Generation Promotion
- Secondary Resources Recovery
- Local and District Heating
- Renewable Energy Sources Use
- Potable Water Systems Modernization

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Romanian Energy Efficiency Fund

Financing Criteria

- Investment Range of US$ 100,000 and US$ 1 million
- Short Investment Payback Time (generally under four to five years)
- Minimum 20% of Investment Amount covered by the beneficiary
- At least 50% of Investment's Benefits come from Energy Savings

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Romanian Energy Efficiency Fund

Market Data

National Energy Saving Potential of about 30-40% (€ 2,7 billion)

Fund Resources: US$ 8 million (from which contracted US$ 2,875 million)

Fund Results: Each investment of US$ 1 leads to Energy Savings of US$ 0.34 and to a gain of US$ 0.03 by Emission Trading
(Quotations: € 133/toe and € 4/ton CO_2)

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Romanian Energy Efficiency Fund

Conclusions

There is a High Potential National Energy Efficiency Market.

The Market is still immature. Its Development need Time and Success Stories.

Fund Results based Perspectives

- Each investment of US$ 1 leads to Energy Savings of US$ 0.34 and to a gain of US$ 0.03 by Emission Trading (Quotations: € 133/toe and € 4/ton CO_2).
- Each investment of US$ 1 attracted other US$ 0.54 (Customer Income and Emission Trading).

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Romanian Energy Efficiency Fund

Crediting Intelligent Consumption

http://www.free.org.ro/

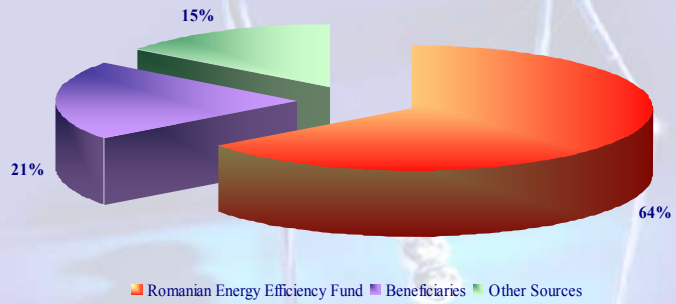
Romanian Energy Efficiency Fund

Strauss Building
2A, Johann Strauss Street, Floor 6, Sector 2, RO - 020312 Bucharest 30, Romania
Phone: +40 21 233 88 01; Fax: +40 21 233 88 02

Romanian Energy Efficiency Fund

Co - financing of Investments in Energy Efficiency Projects

Co-Financing Shares in the Investment Total Amount of US$ 4,22 million



Mihai VORONCA, FREE, Romania

Romanian Energy Efficiency Fund

Project Portfolio (June 29th, 2005)

Application (Processing Stage)	Project Description (Key Words)	Loan (US$ million)
7 Financing Contracts	Air Compressors, DH Substations and Networks (Geothermal and Fossil Fuel), Industrial Boilers on Biomass, Energy Management Systems, Paper Machine Steam/Condensate System, Outdoor Public Lighting, Dwelling Heating Boiler	2.875
7 Analyses in Advanced Stage	Industrial Heat Generation Systems, Outdoor Public Lighting, Glass Furnace Modernisation, Industrial Local Heating Systems	2.772
0 Accord in Principle AP	-	-
11 Analyses in Early Stage	Industrial Heat Generation Systems on Biomass and Biogas, Outdoor Public Lighting, Industrial Thermal Rehabilitation, Industrial Local Heating Systems, Cogeneration, Air Compressors	4.854
3 Agreements in Principle (Signed by Clients, the Fund and the UNDP/GEF EE Project)	Industrial Thermal Rehabilitation, Cogeneration, Ventilation and Blowing Air Exhausters, Outdoor Public Lighting, Industrial Heat Generation Systems	1.685* * estimations
Total		12.186

Romanian Energy Efficiency Fund

National Project Portfolio: Study Cases

Mihai VORONCA, FREE, Romania

Romanian Energy Efficiency Fund

Machine Building Industry

Company	**UNIO S.A. Satu Mare**
Project Type:	*Replacement of Air Compressors*
Project Size (US$)	**290,000**
Fund Loan (US$)	130,000
Reimbursement Period (years)	**3.0**
Payback Time (years)	2.6
Net Present Value (US$)	264,000
Internal Rate of Return (%)	37
Annual Energy Savings (toe)	440
Annual CO_2 Emissions (ton)	- 1,530
Annual SO_2 Emissions (ton)	- 27

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Romanian Energy Efficiency Fund

District Heating (Geothermal)

Company	**TRANSGEX S.A. Oradea**
Project Type:	*Connection of 5 DH Substations to Geothermal Energy*
Project Size (US$)	**1.178,474**
Fund Loan (US$)	425,000
Reimbursement Period (years)	**3.0**
Payback Time (years)	2.5
Net Present Value (US$)	1,140,000
Internal Rate of Return (%)	39
Annual Energy Savings (toe)	5,800
Annual CO_2 Emissions (ton)	- 14,300

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Romanian Energy Efficiency Fund

District Heating

Company	**CET S.A. Iaşi**
Project Type:	*Modernization of 3 DH Substations and Distribution Networks*
Project Size (US$)	**1.250,000**
Fund Loan (US$)	980,000
Reimbursement Period (years)	**2.0**
Payback Time (years)	6.0
Net Present Value (US$)	377,000
Internal Rate of Return (%)	17
Annual Energy Savings (toe)	937
Annual CO_2 Emissions (ton)	- 2,831

October 28, 2005 Energy Efficiency Potential in Buildings, Tallin, Estonia, July 6 - 8, 2005 15

Romanian Energy Efficiency Fund

Food Industry

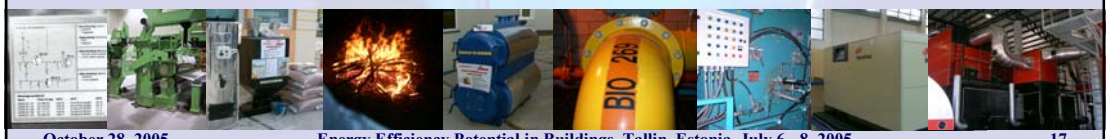
Company	**ULEROM S.A. Vaslui**
Project Type:	*Installation of a sunflower peels based boiler*
Project Size (US$)	**560,000**
Fund Loan (US$)	448,000
Reimbursement Period (years)	**4.0**
Payback Time (years)	4.3
Net Present Value (US$)	400,000
Internal Rate of Return (%)	23
Annual Energy Savings (toe)	621
Annual CO_2 Emissions (ton)	- 1,487

October 28, 2005 Energy Efficiency Potential in Buildings, Tallin, Estonia, July 6 - 8, 2005 16

Romanian Energy Efficiency Fund

Pulp and Paper Industry

Company	**SOMEŞ S.A. Dej**
Project Type:	*Installation of Plant EMS; Modernization of Paper Machine Steam/Condensate System*
Project Size (US$)	**940,000**
Fund Loan (US$)	752,000
Reimbursement Period (years)	**4.0**
Payback Time (years)	1.7
Net Present Value (US$)	2,939,000
Internal Rate of Return (%)	60
Annual Energy Savings (toe)	1,130
Annual CO_2 Emissions (ton)	- 2,807



REEEP - renewable energy & energy efficiency partnership

Beata Wiszniewska,
Regional Director for the EU Member States
The Regional Environmental Center
for Central and Eastern Europe

Global support and local delivery

- **UN Type II partnership launched by the UK government, we receive strong support and funding from Britain.**
- **Goals based on G8 Energy Task Force and international consultation process conducted in summer of 2003.**
- **As an international partnership, REEEP Partners comprise governments, businesses and NGO's committed to accelerating the uptake of renewable energy and energy efficiency.**
- **Current funding is provided by the Austrian, Dutch, Irish, Italian, Spanish, UK governments and the European Union.**

reeep renewable energy & energy efficiency partnership
THE REGIONAL ENVIRONMENTAL CENTER for Central and Eastern Europe
The regional REEEP secretariat
for Central and Eastern Europe and Turkey
<www.rec.org/reeep>

REEEP Objectives
"generate green kilowatts & save energy"

- **Stimulate a significant global increase of investments in RES energy sources**
- **Stimulate significant increase in the global use of energy efficiency measures**
- **Improvement of rural energy supply by utilisation of RES energy sources and higher energy efficiency**

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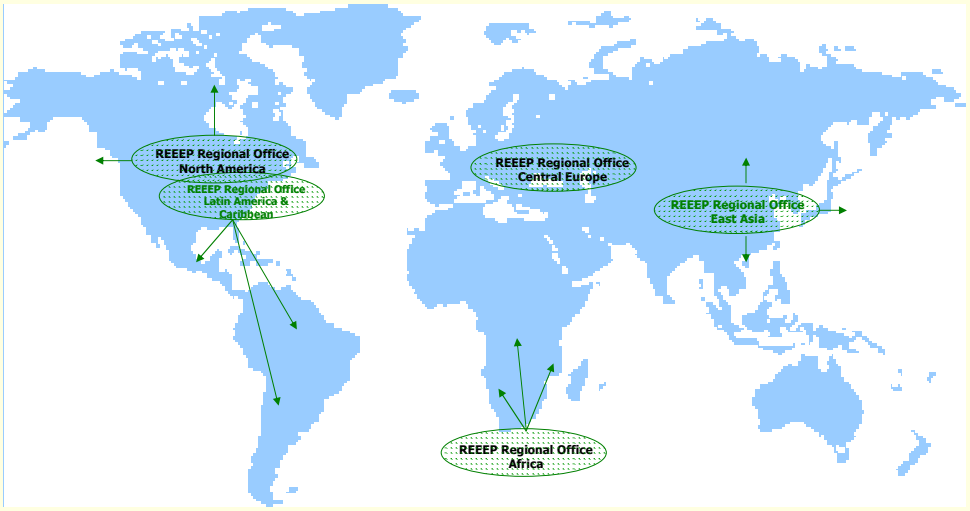
Delivering Value via Regional Secretariats



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Regional Secretariat for Central and Eastern Europe

- **The region:**
  - **Albania, Bosnia and Herzegovina, Bulgaria, Croatia, The Czech Republic, Estonia, Hungary, Latvia, Lithuania, FYR Macedonia, Poland, Romania, Slovakia, Slovenia, Serbia and Montenegro, Turkey**
- **The responsibilities:**
  - **Operates as a regional clearinghouse of information regarding RES/EE**
  - **Serves as coordinator of regional capacity building initiatives**
  - **Identifies regional key opportunities for REEEP and supports REEEP projects and partner interests in region**
  - **Establishes regional REEEP infrastructure**

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Become a Partner

- **Sign up to the goals of REEEP**
- **Demonstrate that your organisation is working to increase the penetration of renewables and energy efficiency systems, making them affordable energy options for all**
- **Preferably bring something to the partnership, either through a financial contribution or through a contribution in kind (e.g. time, expertise, project work, research, membership database) or just be interested!**

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Benefits of the Partnership

- Information exchange
- Web site, email system & virtual project management
- Promotional opportunities
- Networking & matchmaking opportunities
- Media Relations
- Global Secretariat

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Power to Change

- Exhibit developed by the Regional Environmental Center for Central and Eastern Europe (REC) for the Renewable Energy and Energy Efficiency Partnership (REEEP)
- Features displays and models that illustrate the history, state of the art and need for renewable energy and energy efficient technologies
- Features functioning models, a timeline of technological advances, case studies of successful uptake and an introduction to REEEP
- Exhibited in Budapest will journey to other countries in the region before travelling the world
- Please let us know if you want to have it in your country!

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Thank you for your attention

Beata Wiszniewska (BWiszniewska@rec.org)

www.rec.org/reeep

www.reeep.org

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ANNEX:

Extra-materials

Republic of Serbia
Serbian Energy Efficiency Agency

IMPROVEMENT OF ENERGY EFFICIENCY IN SERBIA

Aproach, programmes and projects

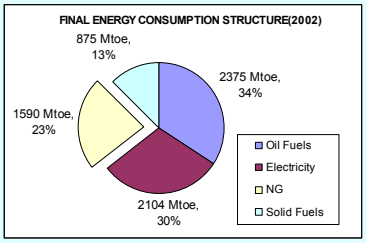
Nenad Pavlovic, MSc
Director

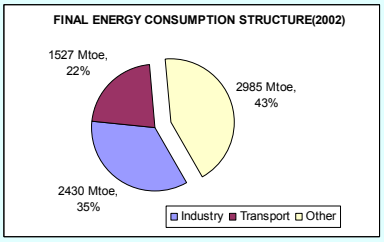
Tallinn, 6-8 July 2005

The establishment and operation of the Serbian Energy Efficiency Agency has been funded by EU through European Agency for Reconstruction

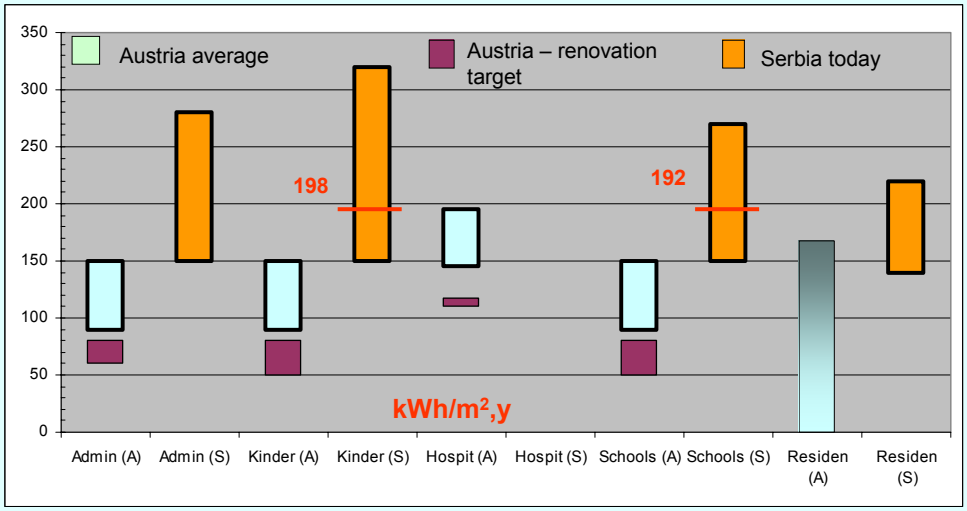
Actual energy consumption

- Low energy consumption *per capita*
  - Primary energy– 1.3 toe (up to 3 times less than in EY-15)
  - Electricty – 3200 kWh (twice less than EY-15, but also Slovenia)
- High energy intensity
  - 0.84 toe/1000 USD (up to 6 times higher than in EY-15)
- Low Final Energy : Primary Energy ratio = 56%
- Net import: NG 30%, Oil fuels 60%
- Low import dependency = 37%
- Increase of energy consumption *per capita*
- Increase of import dependency
- Increase of NG share in import energy

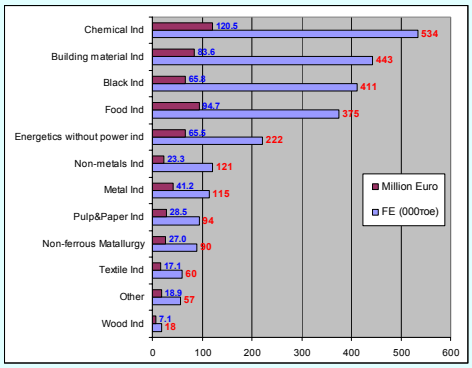




EE indicators in buildings - heating



Energy consumption in industry



FINAL ENERGY CONSUMPTION

- **2540 ktoe** (2002)
- **Fossil fuels** - Chemical, Building materials, Black metallurgy, Pulp & Paper industry - 75% of the total consumption
- **Electricity** – Chemical, Pulp & Paper, Metal, Non-Ferrous, Building materials, Energetic without power industry - 75% of the total consumption
- **ANNUAL ENERGY COSTS AROUND 600 million Euro**

SPECIFIC CONSUMPTION

- Average 0.540 kgoe / USD
- World average 0.190 kgoe / USD

Nenad PAVLOVIC, Serbian Energy Efficiency Agency, Rep. of Serbia

Ambient Framework

- Economy development strategy – No
- Energy Law – Yes
  - Energy agency / regulatory body
  - Serbian Energy Efficiency Agency
- Environmental Protection Law – Yes
  - Environmental protection Fund
- Energy Development Strategy – Yes
  - adopted in the Parliament in April 2005
- Kyoto protocol ratification foreseen by end 2005
- Energy Efficiency Policy – Yes/No

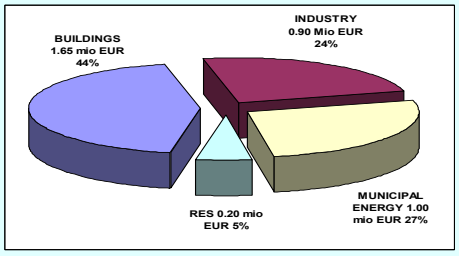
Multi-annual programmes

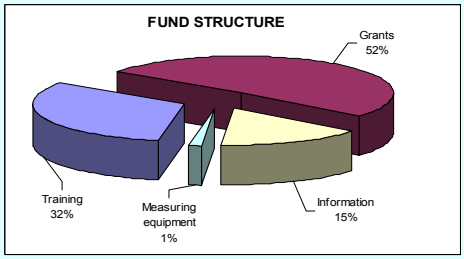
- Alignment of governmental policy with energy efficiency trends
- Energy efficiency in buildings / EAR funded
- Energy efficiency in municipal energy /EAR
- Energy efficiency in the industry /EAR
- Energy efficiency in transport
- Renewable energy sources (RES) / EAR
- Cogeneration

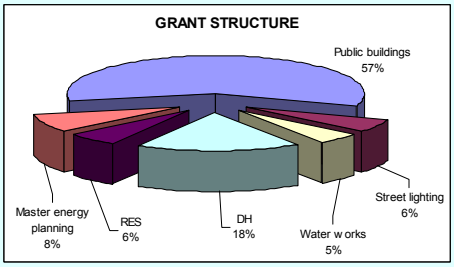
Source of financing

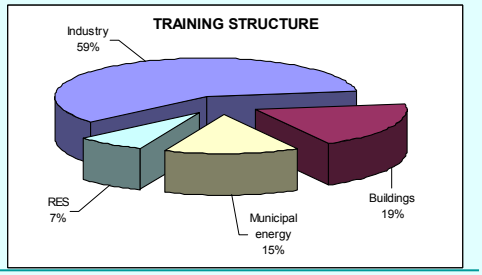
- EU (EAR) –Euro 5 M
  - Grant of Euro 3.75 M for projects
  - Grant for operation costs
- World Bank – USD 21 M
  - 'Serbian Energy Efficiency Project'
  - IDA credit to the Republic of Serbia
- Government of the Kingdom of Norway
  - Technical assistance to Ministry of Mining and Energy and SEEA
  - Around 300,000 Euro annually
- State Budget – part of operation costs

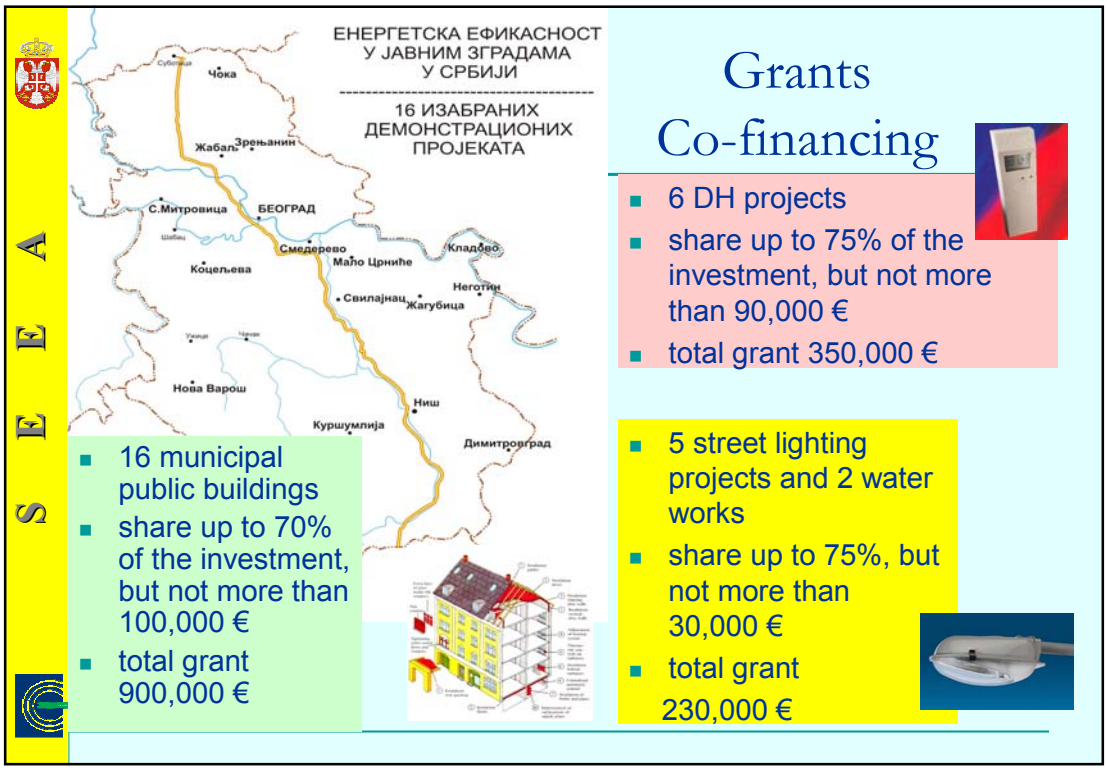
EU Special Fund (EAR)











- 16 municipal public buildings
- share up to 70% of the investment, but not more than 100,000 €
- total grant 900,000 €

Grants Co-financing

- 6 DH projects
- share up to 75% of the investment, but not more than 90,000 €
- total grant 350,000 €

- 5 street lighting projects and 2 water works
- share up to 75%, but not more than 30,000 €
- total grant 230,000 €

RES

- **Construction of Small HPP with capacity 40 kWe**
- **FS for Small HPP 4 MWe**

- **FS for solar thermal and geothermal energy use in Rusanda spa**

- **Wood waste fired boilers 2 x 250 kWth**
- **FS for biomass waste fired DH plant in town Negotin**
- **Biomass Forum**

- **FS for geothermal water use in Bujanovac spa**
- **Workshop on geothermal energy**

Nenad PAVLOVIC, Serbian Energy Efficiency Agency, Rep. of Serbia

Training for Industry

EAR GRANT

- Energy Auditing in Industry (30 trainees, 18 factories)
- EMS in the industry (80 trainees, PFS for EMS implementation in 3 factories)

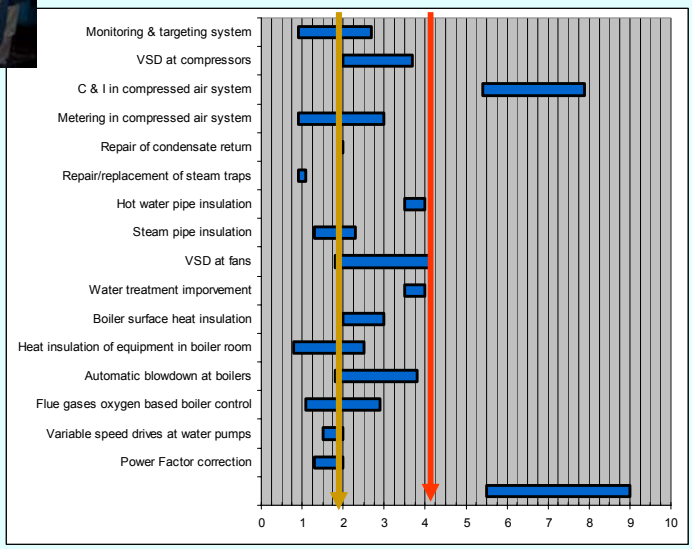
NORVEGIAN GRANT

- Financial Engineering (24 trainees, 10 business plans)
- EMS in food industry (24 trainees, 6 factories)
- Serbian Industrial Energy Efficiency Network

Over 150 trainees

38 factories

Cost effective energy saving measures in the industry

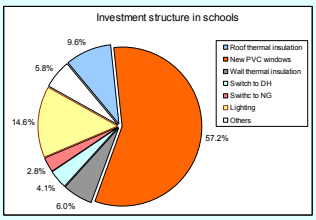


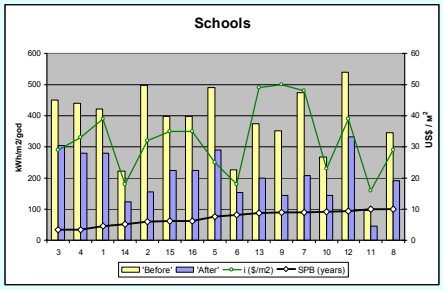
Capacity building in municipalities

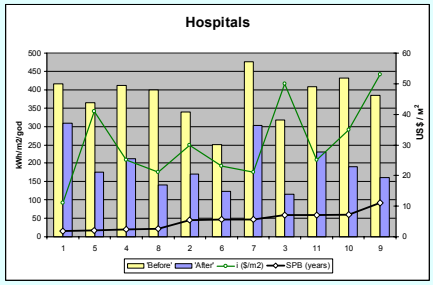
- **Training on energy management in municipalities**
  - 46 trainees from 46 municipalities
  - energy efficiency indicators for DH, water works, public buildings and street lighting

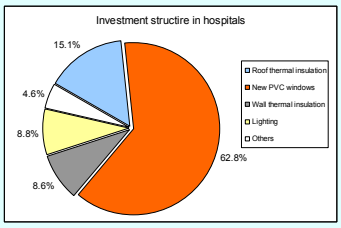
Master energy planning in municipalities
- 3 medium sized towns
- Energy Efficiency Action Plans

Serbian Energy Efficiency Project (funded through WB credit)









Nenad PAVLOVIC, Serbian Energy Efficiency Agency, Rep. of Serbia

Methodology

INVESTMENTS packages

MEASURING

SOCIAL SURVEY

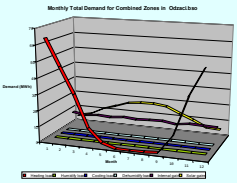
STATE 'BEFORE'

WORKS

MEASURING

SOCIAL SURVEY

STATE 'AFTER'



EVALUATION

PROCESS

ENERGY AUDITS

In the future

- National Energy Efficiency and RES Programme
  - cooperation between several ministries and SEEA
- Energy Efficiency and RES Fund
  - Fund Model and close connection to the National EE & RES Programme
  - Connection with Environmental Protection Fund
- Secondary legislation and supporting instruments
  - in accordance with EU Directives
- Capacity Building
  - Training, local and regional agencies
- New products and service market development
- Information

Nenad PAVLOVIC, Serbian Energy Efficiency Agency, Rep. of Serbia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SEEA

Cost-Effective Climate Protection in the EU-Building Stock

Thermal Protection of Buildings 2005

Chris Hamans MSc.
Rockwool International

ROCKWOOL

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION

Who we are: the European Mineral Wool Industry

- **EURIMA is the European Association of Insulation Manufacturers** and represents the interests of all major mineral wool producers throughout Europe
- Members of EURIMA operate in Austria, Belgium, Czech Republic, Slovakia, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.
- In manufacturing mineral wool, members of EURIMA help to achieve important social and environmental goals: saving energy, minimising pollution, combating noise, reducing the risk of fire and creating European jobs.
- EURIMA represents 20,000 employees in Europe and the installation of mineral wool keeps many more European at work.

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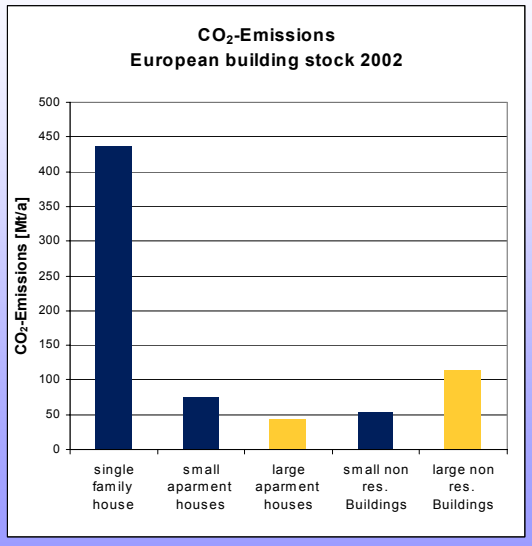
Ecofys 1: The role of buildings in EU15



- Buildings account for 40% of all energy use in the EU
- Total heating related CO_2-Emissions amounts to 725 Mt/a
- More than half of that could be saved through simple and cost-effective measures

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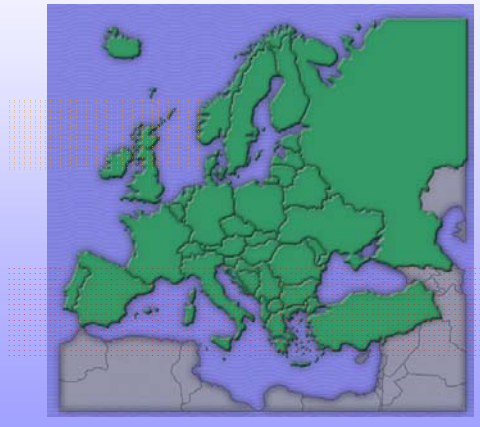
Key finding - 1

Greatest potential is in warm and moderate climatic regions



319 million tonnes

65 million tonnes

for EU15

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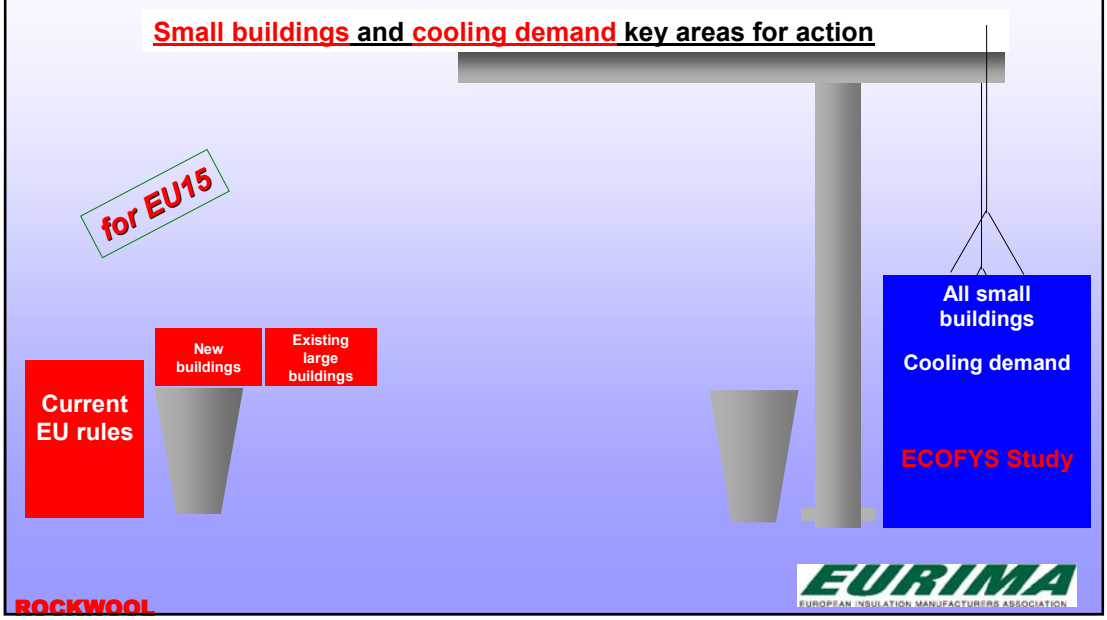
Key finding - 2

Small buildings and cooling demand key areas for action



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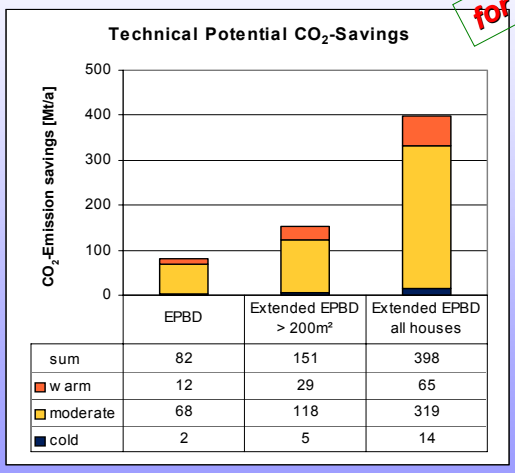
Key findings 3 - in detail

for EU15



	EPBD	Extended EPBD > 200m²	Extended EPBD all houses
sum	82	151	398
w arm	12	29	65
moderate	68	118	319
cold	2	5	14

- Technical potential for buildings > 1000 m² amounts to 82 Mt/a
- Technical potential for all buildings: 398 Mt/a
- Main potential in moderate and warm climate

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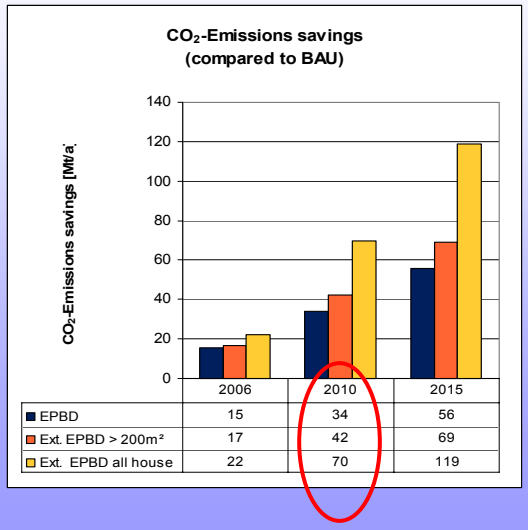
CO_2 saving potential phased implementation



Scenario:

retrofit measures are coupled to renovation cycle

- EPBD results in 2010 in CO_2-emission savings of 34Mt/a
- Extending the scope of the EPBD to all buildings could double the CO_2-emission savings

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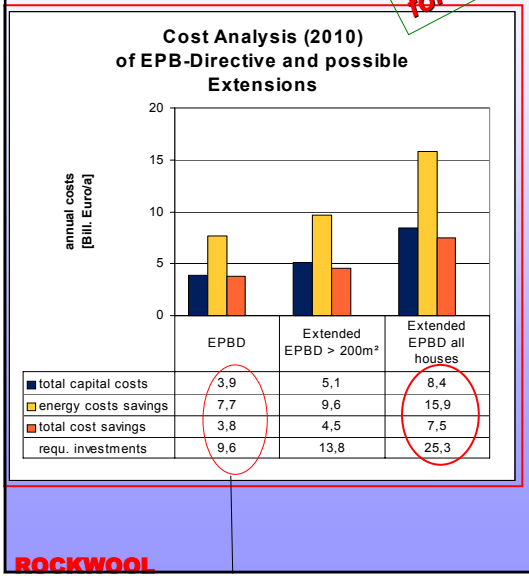
Cost efficiency: the more complex answer

for EU15



- An extended European buildings law that includes all houses would lead to additional annual investments of 25 billion EURO
- This would lead to an increased turnover of building industry of 1%-3%
- All scenarios are cost effective when coupled with renovation, many are cost-effective when not coupled
- Implementing and extending the European building law to all buildings would save 7.5 billion EURO in 2010 and over 13 billion EURO in 2015

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Eurima's latest study for new accessed countries

Ecofys 4 and 5

preliminary results

- Quantification of saving potential
- Cost efficiency calculations

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Ecofys 4 and 5
modelling the building stock

EU 10

- The Baltic countries
  - Estonia
  - Latvia
  - Lithuania
- Poland
- Czech Republic
- Slovakia
- Slovenia
- Hungary
- *Cyprus*
- *Malta*

EU 8

CO_2 ~ 1%

Energy Carrier	Emission factor [g/kWh]
Gas	202
Oil	266
Coal	338
Electricity EU-8	610
Wood	20
District heating (Baltic Republics 2002)	237
District heating (Poland 2002)	539
District heating (CZ-HU-SI-SK 2002)	258

Climatic zone	Baltic Republics	Poland	CZ, HU, SI, SK
HDH [kKh/a]	96.0	92.4	81.6
Heating degree days [Kd/a]	4000	3850	3400

	Energy tariff 2002	Annual rate of increase	average value 2002-2032
	cent/kWh		cent/kWh
Gas	2.47	1.50%	3.17
Oil	3.58	1.50%	4.59
Coal	1.69	1.50%	2.17
Electricity	8.49	1.50%	10.88
District heating	3.54	1.50%	4.53
Wood	1.69	1.00%	1.99

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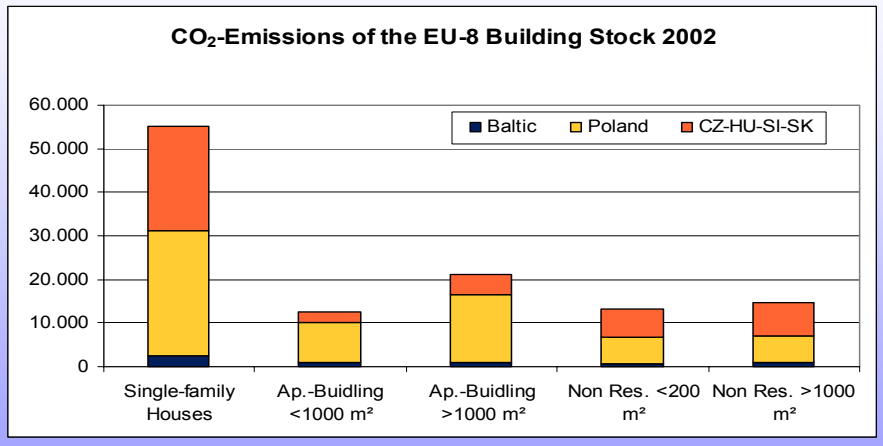
Eurima – Ecofys IV and V
CO2-EMISSIONS EU-8



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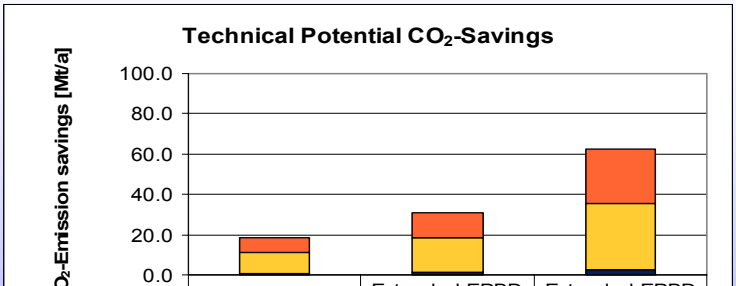
Technical Potential for CO_2-savings



	EPBD	Extended EPBD > 200m²	Extended EPBD all houses
sum	18	31	62
CZ-HU-SI-SK	7	12	27
Poland	10	17	33
Baltic	0.8	1.5	2.8

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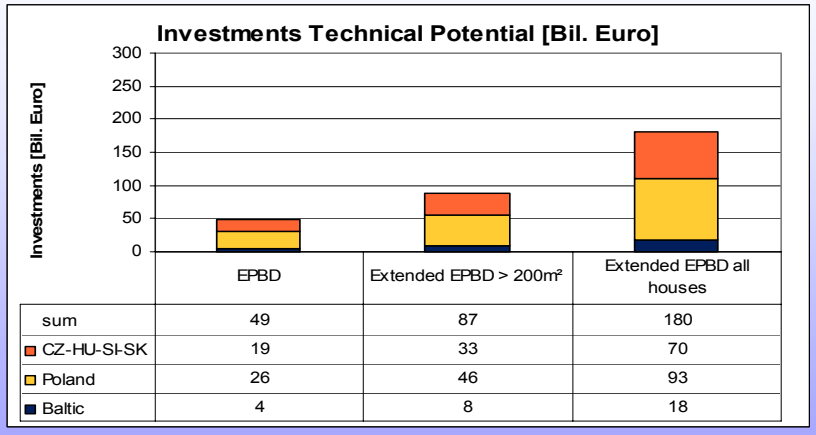
Investments for Technical Potential



	EPBD	Extended EPBD > 200m²	Extended EPBD all houses
sum	49	87	180
CZ-HU-SI-SK	19	33	70
Poland	26	46	93
Baltic	4	8	18

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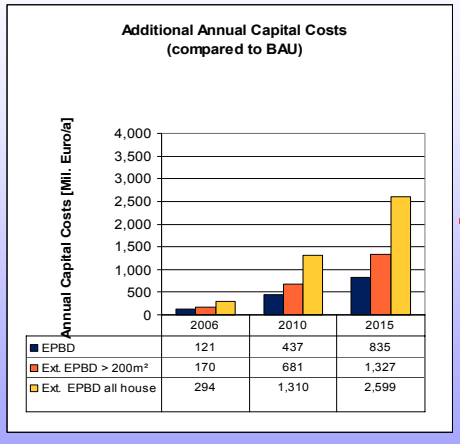
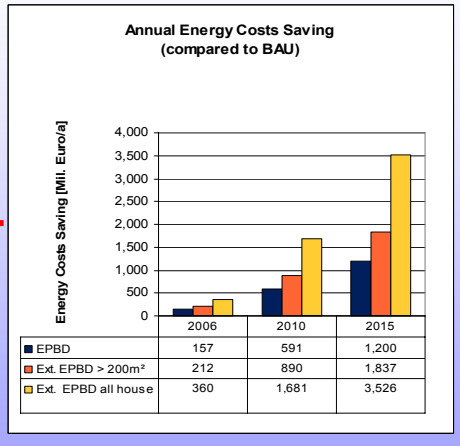
Cost efficiency



	2006	2010	2015
EPBD	121	437	835
Ext. EPBD > 200m²	170	681	1,327
Ext. EPBD all house	294	1,310	2,599



	2006	2010	2015
EPBD	157	591	1,200
Ext. EPBD > 200m²	212	890	1,837
Ext. EPBD all house	360	1,681	3,526

ROCKWOOL

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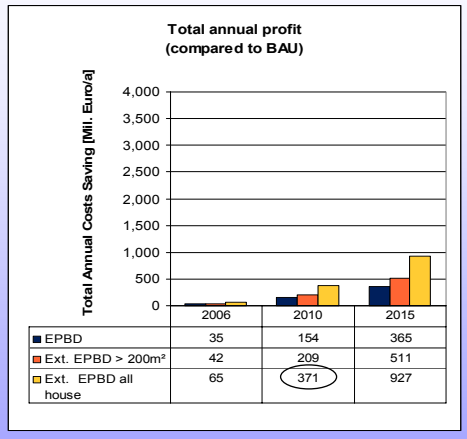
Chris Hamans,EURIMA

A profitable investment



	2006	2010	2015
EPBD	35	154	365
Ext. EPBD > 200m²	42	209	511
Ext. EPBD all house	65	371	927

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The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

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